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THE IRON TRADE REVIEW

VOL. XXXI. CLEVELAND, O. SEPTEMBER 1, 1898. CHICAGO, ILL. NUMBER 35

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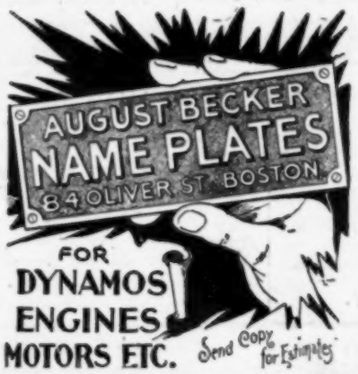

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On Page **25.**

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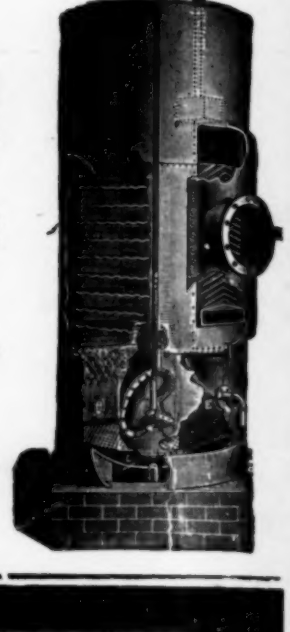

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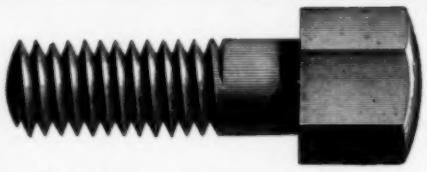

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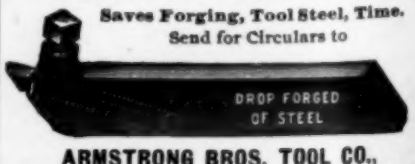

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THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. SEPTEMBER 1, 1898. CHICAGO, ILL. NUMBER 35

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The scale of consumption in all lines is notably large, and the recent advances in Bessemer pig iron and steel billets are being followed by firmer markets in all departments of the finished steel trade, and actual advances in some. Sheets and tin plates are higher than at last week's report. In the other important line of billet consumption, the wire interests, there has been no change. While strikes at some of the plants of the largest manufacturer have cut down production, stocks at mills are ample for the present moderate demand. The feeling is general throughout the iron trade that under the heavily sold condition of Bessemer steel works and the liberal scale of finished material orders to-day and throughout the summer, the present basis promises to be maintained for some months, with advances in lines that have not kept pace as yet with the movement in primary markets. Some further sales of Bessemer iron have been made at $10 at valley furnace, and the possibility of an advance to $10.50 is being discussed, but without present indication of a more tangible outcome than the facilitating of business at $10. Foundry irons have been generally quiet since the advances of 25 cents and upward announced by Southern furnaces. Just now Northern irons are relatively lower in middle territory. A 5,000-ton sale of basic iron at Philadelphia was at an advance of 15c. Some slight addition to foundry iron capacity has been made by recent furnace resumptions. Furnaces starting in the valleys are about equally divided between foundry and Bessemer. Gray forge has made a further advance, bringing $9 and $9.10 valley furnace, and $9.35 to $9.45 Pittsburg. The scarcity of billets for early delivery and the beginning of sales for the first half of 1899 are the features in the steel market. Tin plate mills are covering in part up to July, 1899, though some steel mills up to the past week had been unwilling to quote so far ahead. There is some diversity of views, but contract quotations on tin plate bars have been made for 1899 at 50 to 75 cents below the present advanced market. Billets for 1898 delivery are maintained at $16.25, Pittsburg, and $15.85 to $16 Wheeling. In the East advaces have been made to the basis of $17.85 to $18, Philadelphia. A sale of 40,000 tons by an Eastern mill was made at a considerably lower figure, deliveries running into 1899. Some figuring is reported on steel rail contracts for 1899, and Chicago notes sales of 25,000 tons on the basis of current quotations, for delivery next year. Foreign inquiries for billets and rods keep up steadily, but the advance limits transactions. The meeting of sheet manufacturers at Pittsburg and the reports made from the various mills showed that demand has been well maintained in that line, and in view of the advance in steel and the well filled sheet mill order books, an advance of $2 a ton was decided upon. One department of the market that has been inert for some time and is now quite active, is old materials. Considerable purchases of old rails have been made, and heavy steel scrap has been stronger in the East. A scarcity of mill scrap is noted in some quarters, causing larger purchases than usual of forge iron. The week has seen the closing of some details in connection with the organization of the new steel and ore consolidation. Simultaneously rumors are revived of efforts to put through the tin plate combine that has proved an impossible problem thus far.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.*
808 TRADESMEN'S BUILDING, Aug. 30.

There have been slight advances in gray forge and foundry irons in the past week; and the price of black and galvanized sheets is higher as a result of the meeting of manufacturers held here Tuesday. Foreign inquiries are more numerous than a week ago, but the prospective buyers are fighting shy of the advanced prices. The contract for the Coolgardie material will not be placed for sometime on account of the large number of bids.

PIG IRON.—The furnacemen's price is still the basis of the sales made. The furnacemen are credited with the intention of a 50-cent advance, to take effect early in September, but it is understood no meeting will be held until next week, the time appointed six weeks ago Among recent sales is one at $10.65, Pittsburg. Since the rumor of the above-mentioned advance some sellers have withdrawn from the field and are waiting to see what happens. Gray forge has advanced over last week's prices, being now quoted from $9.35 to $9.45 with even higher prices probable. Foundry irons have stiffened also and are moving better than for some time past. No. 2 is quoted from $10.15 to $10.25. It is argued that the strength in gray forge and foundry irons will make an advance in Bessemer a natural step. We quote as follows:

Bessemer, valley	$	$ 10.00
Bessemer, Pittsburg		10.65
No. 1 Foundry	10.50 to	10.65
No. 2 Foundry	10.15 to	10.25
No. 3 Foundry	9.65 to	9.85
Gray Forge, valley furnace	9.00 to	9.10
Gray Forge, Pittsburg	9.35 to	9.45

BILLETS AND RODS.—No further advance has been made in billets, the quotation still being from $16.25 to $16.50, maker's mill Pittsburg. The Wheeling price is $16, which was shaded in one transaction the past week. There is no let-up in the demand for sheet and tin plate bars and the quantity to be had is far short of the demand. The quotation is from $17.75 to $18 at the mill. A sale of something over 1,000 tons of tin plate bars at $18 maker's mill with delivery through the next quarter is one of the week's transactions. Foreign inquiries for rods continue to come in steadily, but few if any sales have been made in view of the present price of $22 at the mill. Home demand is good at this figure, but rods are very scarce and prompt delivery is still an impossibility.

SHEETS.—A meeting of the manufacturers was held Tuesday at which they decided to advance the price of black sheets $2 per ton. Galvanized sheets were advanced 5 per cent. These prices are effective for all new business. The new quotation on No. 28 is 2c, and in the case of galvanized sheets the discount is 80 and 5 per cent off list, with usual freight allowance Business has continued good during the week, buyers having some difficulty in placing orders, as the manufacturers were quite well assured that the advance above noted would be decided upon and were unwilling to book new orders at old figures with business enough booked to keep their mills running for some time.

IRON AND STEEL SKELP.—Increased inquiry for both grooved and sheared iron skelp has caused an advance in the

last week of those materials. Steel skelp, both grooved and sheared, is in good demand, and is firm at last week's quotations. We quote as follows: Grooved iron skelp, 1.10c to 1.12½c; sheared iron skelp, 1.17½c to 1.20c; grooved steel skelp, 1.02½c to 1.05c; sheared steel skelp, 1.10c to 1.12½c.

STRUCTURAL MATERIAL.—The week has been without incident. The orders continue to come in steadily and the excellent tonnage of several weeks past is being maintained. Prices are as follows: Beams and channels, 3 to 15 inches, 1.20c; 18 to 24 inches, 1.30c; tees, 1.25c; zees, 1.20c and angles 1.10c. Universal plates alone at 1.15c; with other shapes 1.05c.

PIPES AND TUBES.—This week finds the mills still crowded and manufacturers are compelled to turn away good orders on account of impossibility of shipment under three weeks. The additional discounts of six tens for less than car load and six tens and two and a half for car load lots are quoted. Base discounts are as follows: Butt weld, black, 57 per cent off; lap weld, black, 67 per cent off; butt weld, galvanized, 50 per cent off; lap weld, galvanized, 55 per cent off. Discounts on merchant boiler tubes are as follows: 2¼-inch and smaller, 72½ per cent off; 2½ inch and larger, 75 per cent off. Inserted joint casing is quoted at 60 and 5 per cent and screw and socket joint at 65 and 5 per cent.

FERRO-MANGANESE.—The quotation continues at $50 for 80 per cent domestic delivered.

RAILS AND TRACK MATERIAL.—The mills report light rails in good demand and few if any in stock or to be had on reasonable delivery. Whenever an opportunity permits the rolls are put in and the mills are put on light rails but as the heavier sections demand most of their attention, they are making poor headway on the lighter ones. Sixteen pound rails are quoted at from $19 to $19.50, with heavy sections steady at $18. Other prices are as follows: Iron track bolts, 1.65c to 1.70c; splice bars, 1.10c to 1.15c; links and pins, 1.20c; spikes, 1.40c to 1.45c.

SPIEGEL.—Demand is quiet and the price is still $23.50 to $24.

SPELTER.—Spelter has fluctuated as usual. At present it is higher than a week ago being, quoted at $4.75 to $4.85.

PLATES.—The excellent condition noted last week still prevails. The buying is general and a large tonnage is being placed, although no very large single orders have been handled. Bids for the Coolgardie, Australia, order, which involves from 60,000 to 100,000 tons of plates, were opened Aug. 23, but the great diversity of work under the contract and the large number of bids received will necessitate an elaborate scheduling of the tenders. It will likely be a week or two before the successful firms are announced. Prices are the same as last week's and are as follows: Tank, 1.15c; shell, 1.20c; flange, 1.25c; fire-box, 2c and upwards.

OLD MATERIAL.—The good demand for old material continues and prices have stiffened in some cases. Consumers are buying more freely than heretofore. Among the sales of the week were 1,000 tons steel rails at $10.20 and 1,200 tons iron rails at $13.35, valley. Other materials are as follows: Heavy mixed steel scrap, $10.25, cash; cast borings, $6, net, valley; railroad cast scrap, $9, gross; wrought scrap, $12, net, valley; iron axles, $6, net; steel axles, $12.50, gross; car wheels, $10.25, gross; charcoal scrap, $10, gross; billet and bloom ends, run of mill, $11; busheling scrap, $9.50, net; machinery scrap, $9, gross; wrought turnings, $6.75, net, valley.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, Aug. 31.

While pig iron has been quiet, with few sales, and none of them very large, the steel market has been very active, and the demand has been increasing all the time. Sales last week were heavy, including nearly 30,000 tons of rails, most of them for delivery next year. Consumers of all kinds of iron and steel are actively employed and the consumption is undoubtedly increasing all the time. Mills and furnaces are all turning out material to their utmost capacity, and many of them have considerable difficulty in keeping up with their orders. On August 23, Iroquois furnace went out of blast for repairs, which will take it about 30 days to complete. This limits the production of foundry irons, but on the other hand the Union Furnaces of the Illinois Steel Co. have been running on malleable Bessemer for the past 30 days, and will continue to do so for an indefinite time. Prices on all materials are very firm, and on some grades of steel are a little higher.

PIG IRON.—Neither Northern nor Southern furnaces report a very heavy week as regards sales, no large orders having been closed. A fairly good tonnage of small orders is being placed all the time, and the demand is mostly confined to this class of business. There are inquiries in the market for 2,000 tons of foundry iron, and 2,000 tons of malleable Bessemer, both of which will probably be closed this week. Foundries are all busy, and are taking their iron as fast as the furnaces can give it to them. The market is very firm, and Southern agents expect advances to be made by their furnaces within a short time.

Lake Sup. Charcoal	$11 50 @ $13 00	Southern Coke No. 3	$ @ $10 10
Local Coke Fdy. No. 1	11 50 @ 12 00	Southern No. 1 Soft	10 85
Local Coke Fdy. No. 2	11 00 @ 11 50	Southern No. 2 Soft	10 60
Local Coke Fdy. No. 3	10 75 @ 11 00	Southern Silveries	11 25 @ 11 50
Local Scotch Fdy. No. 1	11 50 @ 12 00	Jackson Co. Silveries	12 50 @ 14 50
Local Scotch Fdy. No. 2	11 00 @ 11 50	Ohio Strong Softeners	12 00 @ 12 50
Local Scotch Fdy. No. 3	10 75 @ 11 00	Alabama Car Wheel	15 00 @ 16 00
Southern Coke No. 1	10 85	Malleable Bessemer	11 50 @ 12 00
Southern Coke No. 2	10 60	Coke Bessemer	11 50 @ 12 00

BARS.—Business has been good in the week, particularly in small lots. One or two good sized contracts have been placed, and there are several more in the market to be given out in the near future, but the bulk of the business is in comparatively small lots. The market has been firm, and more mills are asking the higher prices every week. Quotations are unchanged, however, as there are still mills anxious for business that are selling at the old rates. Common iron is quoted at 1.05c to 1.10c; guaranteed, 1.15c to 1.20c; soft steel bars from billet stock, 1.10c to 1.20c.

RAILS AND TRACK SUPPLIES.—The local mills took orders for 25,000 tons of rails for delivery the early part of next year, last week, and further business amounting to about 3,000 tons, for early delivery. The demand continues large, and further business is expected. The market is firm, and higher prices are likely to be made on rails within a short time. Quotations are as follows: Rails, $20 to $22.50, according to specifications; steel splice bars, 1.15c to 1.25c; track bolts, with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.50c to 1.60c.

BILLETS AND RODS.—Only small sales of either billets or rods were made last week. The local mills are full of orders, and are not pushing for business. Quotations are made at $23 to $23.50 for rods, and $17 to $17.50 for billets. This is an advance of $1 over last week.

CAR ORDERS.—While no large contracts for cars were placed last week, a considerable number were ordered in small lots, and there is a steady demand for car material of all kinds.

PLATES.—Demand is very large, and good sized orders were closed last week, most of the business going to mills farther east. The local mills report having their capacity nearly filled for the balance of the year. Sales from local stocks have been heavy, and give every promise of continuing so for some time. Prices are very firm, and are made as follows: Tank plates, 1.20c to 1.30c; flange steel, 1.30c to 1.40c; fire-box steel, 1.85c to 5c.

STRUCTURAL MATERIAL.—General business in small lots was excellent last week, and bids fair to continue so, but there have been only a few contracts placed involving any considerable tonnage. The steel for an insane asylum at Peoria, Ill., about 1,200 tons, was let last week, going to Pittsburg. Bridge work continues to take considerable material, both for railroad and country work. The market is very firm, but no further advances have been made. Prices are made as follows: Beams, 15 inch and under, 1.35c to 1.40c; 18-inch and over, 1.45c to 1.50c; angles, 1.25c to 1.30c; plates 1.20c to 1.30c; tees, 1.40c to 1.45c; zees, 1.35c to 1.40c. Small lots from stock are quoted at ¼c to ½c higher.

SHEETS.—There is a good demand for both black and galvanized sheets, and last week's sales of both were large. Store business is especially good, but considerable orders have been taken for shipment from mill. Black sheets are quoted on the basis of 2c to 2.05c for No. 27 and galvanized at 80 and 10 per cent off, with the usual freight allowances.

MERCHANT STEEL.—While demand is good, sellers are not anxious to contract ahead at present rates, but are more inclined to put purchasers off as long as possible. Quotations are made for immediate delivery as follows: Open-hearth spring, tire and machinery steel, 1.60c to 1.70c; smooth

finished machinery steel, 1.55c to 1.65c; smooth finished tire, 1.45c to 1.55c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—There is a little better inquiry, and some sales have been made, although none of them were large. There is still a decided shortness in cast scrap, some dealers being out of it entirely. Prices quoted are nearly all nominal, as the lack of transactions makes it difficult to gauge the market. Dealers' selling prices are as follows:

Old iron rails, gross,	$12 50@$12 75	Axles, net	$14 25@$14 75
Old steel rails, long, gr.	10 50@ 11 00	Cast borings, net	4 25@ 4 50
Old steel rails, short	8 75@ 9 00	Wrought turnings, net	6 00@ 6 50
Old wheels, gross	11 00@ 11 50	Axle turnings, net	7 00@ 7 25
Railroad forge, net	11 50@ 12 00	Mixed steel, gross,	7 25@ 7 50
Dealer's forge, net	10 00@ 10 50	Stove plates, net	5 75@ 6 00
No. 1 mill, net	7 50@ 8 00	Heavy melting steel, gr.	8 25@ 8 50
Heavy cast, net	8 50@ 9 00	Old iron splice b., net.	12 75@ 13 00
Malleable cast, net	8 00@ 8 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World*, 27 VINCENT ST., Aug. 31.

The time of year is approaching when the lake freight situation assumes greater prominence as a factor in ore calculations. The 50-cent rate from Lake Superior was established in the past week. The Escanaba basis is nominally 40 cents, but there appears to be a special effort by vessel owners to keep offers of Escanaba tonnage down to a minimum. There are evidences that a considerable amount of ore is yet to be moved under wild charters, and the grain movement promises to be sufficient to maintain a fairly remunerative level for the balance of the season. In the past week further sales of ore in moderate lots have been made. The effect of the new consolidation on the ore business is a matter of present interest. It is considered entirely probable that the consolidated company will be a seller of Vermilion non-Bessemer ores and of Mesabi grades, and to some small extent a buyer of old-range Bessemers. The probability of direct handling of ore and direct management of the company's fleet is also discussed.

PIG IRON.—Compared with the preceding one, the past week has been of little moment in local pig iron transactions. Some further sales of Bessemer at $10 valley furnace have been made through Pittsburg. There is no substantial basis for the reports of a 50-cent advance by the associated furnacemen. No meeting is to be held until next week. Meantime buyers are closely following developments, particularly in view of the pendency of 1899 business in steel. Forge iron is firm at the advance to $9 at valley furnace and demand is growing in response to the condition of rolling mill order books. In foundry irons, prices are being held on a higher basis by some furnaces, though the buying of the last week has not been large. Most buyers are in position to wait for some time before making large contracts. We quote $9.50 at valley furnace for No. 2, though quotations have been made of $9.75 for higher silicon irons by one or two producers. The following are Cleveland prices, f. o. b.:

Bessemer	$10 65	Valley Scotch No. 1	$10 65
No. 1 Strong Foundry	10 40@10 65	Valley Scotch No. 2	10 15@10 40
No. 2 Strong Foundry	10 15@10 25	Gray Forge	9 65
No. 3 Foundry	9 75@10 00	Lake Superior Charcoal	11 50

BILLETS, ETC.—Steel works are figuring on a considerable tonnage for local concerns and those whose buying is done through Cleveland offices. An inquiry for 2,500 tons of ingots follows considerably increased activity in forgings. Tin plate bar contracts to the extent of 25,000 to 30,000 tons, for the first half of 1899, are being figured on, with some considerable difference developing in the views of steel works as to price. Some mills have been unwilling until now to quote on this business. A few thousand tons have been placed already, Cleveland deliveries ranging between $17.50 and $17.75. We quote $16.25 Cleveland on billets and $22 on rods.

FINISHED MATERIAL.—The volume of business is maintained in all lines. Plates, as heretofore, are active and with no improvement in the ability of mills to make deliveries. Pittsburg mills are still quoting 1.15c, though 1.17½c to 1.20c, Cleveland, equivalent to 1.09c to 1.11½c Pittsburg, is done. Iron and steel bars are stronger. Local jobbers have made an advance in the past week to 1.05c for bar iron out of stock. Bridge work is a continuing factor of importance in the structural demand. The Hamilton, O., bridge, just taken by a Toledo works, is the largest piece of new work. Sheets are generally higher, by action of the manufacturers at Pittsburg on Tuesday. There has been some difference in prices of late, and light sheets apparently have not been advanced as much as the heavier gauges. The advance now made brings mills that have been low sellers recently, up to the level of those whose well-sold condition led them to put up prices several weeks ago. We quote No. 27 at 2.07½c to 2.10c Cleveland, and No. 28 at 2.15c. An inquiry for 3,000 tons of rails for electric line construction is up, and there is a beginning of figuring on rails for 1899. The situation in the local wire mill strike is practically unchanged. Though production is lessened, stocks are ample and there is no special life in the market. Quotations remain at $1.15 for smooth wire, $1.65 for four-point galvanized and $1.30 for wire nails in car-load lots.

CINCINNATI.

Aug. 30.

Business continues very quiet. The market is firm enough, for no one is cutting the schedule prices, but there is nothing doing in a large way. The demand for shipments on old orders is increasing and a number of concerns are asking to have iron shipped them faster than their contracts specify. In fact there is such a demand for shipments that nearly all of the Southern furnace companies are behind hand on their orders. If there is any feature in to-day's market it is this. The advance in prices seems to have stopped the buying movement. Well informed observers, however, believe that the check is temporary only, for consumption continues at a rapid rate and supplies will be needed later in the year. In Ohio and Indiana more attention is now being paid to Northern irons, the prices of which are decidedly lower at certain points than the delivered prices of Southern brands. The advancing tendency of the market has not increased production of foundry irons, and it is not believed that the output will be appreciably greater during this year, unless values should be forced much higher. Buyers of castings are insisting on a slight advance, because of increased cost. We quote for cash f. o. b. Cincinnati: Southern coke, No. 1 foundry, $10; No. 2, $9.75; No. 3, $9.25; No. 4 and gray forge, $8.75; mottled, $8.75; No. 1 soft, $10; No. 2, $9.75; Tennessee charcoal, No. 1, $12.50 to $13; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Jackson Co. silvery, No. 1, $12 to $12.50; standard Georgia car wheel, $14.25 to $15.

PHILADELPHIA.

Aug. 30.

There is every prospect that the present large demand has come to stay, and that it is far more likely to show a very considerable increase than it is to stand still. In fact, mill and furnace men generally incline to the opinion that the volume of business for the balance of this year and next will be much larger than in any equal period. There is a gradual improvement in values, as makers of iron and steel realize the sold up condition of producers, and the steadily increasing demand. It is believed by most manufacturers that prices for 1899 will be measurably higher than those prevailing at present. The pig iron market shows further improvement, although it comes slowly. The announcement of the leading Southern producers that they are well sold up for the balance of '98, and the advance in prices of Southern iron, have added considerable strength to the market here. The sales of the last week have not been heavy, but a good demand is reported, and business will be better as soon as buyers realize they are on an advancing market. A sale of 5,000 tons of basic is reported at 15c advance. Prices are as follows: No. 1X foundry at $11.25 to $11.75; No. 2X foundry, $10.50 to $11; No. 2 plain, $10.25 to $10.50; standard mill irons, $10 to $10.25; ordinary mill irons, $9.75 to $10; Bessemer, $12 to $12.50; low phosphorus, $16.25 to $16. Billets are in an excited state, and prices are hard to quote. Makers are sold ahead so far as to be indifferent to new business, and are very firm in their views. It is likely that billets could be bought at $17.75 to $18, although some mills refuse to consider offers at the lower figure. A sale of 40,000 tons is reported from Scranton. There is considerable business in sight, as some of the larger users have not yet placed their orders. In finished material the market has been quiet. The demand is good, but mills are sold so far ahead that they cannot consider orders except for delivery much later. All the mills are running full, and some of them are having great difficulty in keeping shipments up to contract time of delivery. Prices are very firm, and are as follows: Beams and channels, 1.35c to 1.50c; angles, 1.25c to 1.30c; refined bar iron, 1.15c to 1.20c; soft steel bars, 1.15c to 1.20c; tank plates, 1.25c to 1.30c.

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AND
INDUSTRIAL WORLD.

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THE NEW STEEL CONSOLIDATION.

Reference was made in our issue of last week to some of the results of the consolidation of the Illinois Steel Co., the Minnesota Iron Co. and the Lorain Steel Co. It would be difficult, even for those who have been prominent in effecting this amalgamation, to schedule the changes in the iron trade that will flow directly from the transaction, and the added changes that will come in the modification it will compel, of the plans of other steel and ore interests. It is no ordinary event, and its consequences will be far-reaching.

Editorials have been written emphasizing the familiar arguments against "consolidation and monopoly." We are told that "a monopoly combine which dominates the iron and steel business will inevitably advance the prices of those products," and a writer in a metropolitan newspaper avers that if this vast scheme of consolidation is "an attempt to restore old monopolies by putting an end to the free play of competition, which has been such a boon to American consumers of iron and steel and their manufactures," then it would be illegal Without stopping to comment on the "boon" feature of the above, it may be said that the monopoly diagnosis of the writer is quite in contrast with that of other editors who scent a battle royal in the distance. The latter see in the Federal Steel Co. preparation for a war against Pittsburg interests that have been particularly active in the past two years in getting on a cost basis guaranteeing a long campaign in the steel markets of the world.

Neither of these views, we believe, correctly gauges the significance of this new consolidation. It is rather a product of events in the iron and steel world, than an effort to control events. It is a part of the evolution in the iron industry rather than an attempt to bring about a revolution If it has an appearance of fixing for aggression it is only on the theory that a war status is the surest means of preserving peace. When the Carnegie Steel Co. became a miner of ore on a large scale and arranged with the Rockefeller interest for carrying its ore at a low figure, fluctuating only within narrow limits, the cry of monopoly went up; but no move ever made in the history of iron and steel manufacture was more plainly the product of an intensely competitive regime. The Federal Steel Co. is one of the later results of the entrance of the Carnegie Steel Co. upon the Mesabi and Gogebic ranges. An immediate result was that ore contracts at Chicago were written with the price clause based on the mining cost of the Pittsburg company; and it was only a step from such an arrangement to an organic union of the Illinois Steel Co. and the company from which, because of common stockholders, it made its largest purchases of ore.

The prominence of Standard Oil stockholders in the new deal has been construed in some quarters as significant of close future relations between the two dominant mining and transportation corporations of the Mesabi range. And it has been only a step from this inference to the conclusion that the Standard Oil interest in the Lake Superior Consolidated Mines and the Bessemer Steamship Co. might facilitate an understanding between the important Pittsburg customer of the two latter companies, and the new company. There is good reason to doubt the correctness of any such surmise. The indications are that the competition on ore between the two leading interests of the Mesabi range will be just as intense as it has ever been.

It was intimated last week that the consolidation might be expected to put the Chicago works on a competitive basis in structural material. The possibility of close relations with imporant wire interests whose billet supply is now coming from Lorain has also been discussed. It would be natural for the Federal Steel Co., with the ample new capital it will have, to enlarge its vessel holdings sufficiently to enable it to carry practically all its ore in its own bottoms. In turn this movement would naturally be followed by enlargements in the Bessemer fleet, giving the Consolidated Co. control of the transportation of all the ore from its mines and leased properties, from the mine to Lake Erie dock.

Since the leading developments in the Central Western iron trade in the past two years have looked to stable prices, small margins and maximum outputs, so that the export trade could be increased, no matter what the conditions at home, we look upon the Federal Steel Co. as only a further development of that policy, and not in any sense opposing it. The problem of ore supply, which is the chief anxiety of English ironmasters to-day, is recognized by American steel masters, too, as the all-dominating consideration. The great Pittsburg, Chicago and Lorain interests have made themselves sure in this respect for many years. What remains is to make a profit on the large capital invested and get so much of the world's business as will keep all the great plants employed to their fullest capacity. The Lorain Steel Co.'s plant, with its unrivaled economies in assembling materials, its cheap by-product coke, its proximity to important consuming interests at home and its facilities for cheap water shipments to the seaboard, promises to be a factor of increasing importance in the consolidated company. Enlarge-

ment of its blast furnace plans is not unlikely, and the location of consuming interests near to these works is a natural development.

The plans of the Federal Steel Co. allow for the addition of other interests whose inclusion would be mutually advantageous. Should there be no outcome of the tentative effort toward further absorption, it is to be expected that outside moves will be made, bringing other steel works and ore producers into closer relations. The coming year bids fair to see some interesting events of this nature.

In his last annual report, of which the preface has just been published, General Manager Swank makes this comment on a cause of low prices in iron, that for some time has not had the attention its significance demands:

A special cause of the continued low prices of pig iron is undoubtedly to be found in the accumulation of warrant stocks. As the price of every product is largely determined by the surplus above the wants of consumers that presses upon the market so the large surplus stocks of pig iron that are in warrant yards, constituting a known quantity and being constantly advertised, act as a heavy weight upon pig iron prices. As late as June 30, 1896, the stocks in the yards of the American Pig Iron Storage Warrant Co. aggregated only 112,000 tons, but at the end of September of that year they amounted to 184,800 tons; on Dec. 31, 1897, they amounted to 275,800 tons; and on June 30, 1898, they still amounted to 258,000 tons. These warrant stocks must be added to the stocks in the hands of manufacturers and on the furnace bank which are for sale and which are semi-annually ascertained by the American Iron and Steel Association. Of course the warrant stocks and the other unsold stocks are only a visible expression of the fact that we are constantly making more pig iron than we are consuming, and may therefore in one respect be classed under the same general head of surplus stocks, but the warrant stocks exercise a particularly depressing influence on pig iron prices because of their speculative character and because the facilities which they offer for obtaining ready money encourage the production of pig iron for which there is no immediate demand.

The stock claim made in behalf of the warrant system, to court the favor of pig iron producers, is that for two more part warrant iron is lifted off the market and does not return, the warrants passing from hand to hand as a convenient and measurably stable form of investment to some and a fairly attractive medium of speculation to others. As the stocks in yards have come to be a larger percentage of the country's unsold iron they have become more of a bear argument, and the movement from the yards into consumption is larger. More and more, too, do they demonstrate their power to hurt legitimate business in iron—that which is carried on by the manufacturer who, with a large investment in plant, has a stake very different from that of the speculator who profits by the changing phases of the market.

A dispatch of Aug. 29 from Duluth says that the new schooner Roebling of the Bessemer fleet broke all records for large cargoes with a load of 7,022 gross or 7,865 net tons of iron ore on Monday. The best former record was held by the Fritz of the same line, a sister ship of the Roebling, with 6,959 gross tons. The draft was 17 feet 6 inches fore and aft.

The Carnegie Steel Co., Ltd., has been awarded the contract for furnishing 2,500 tons of armor plate for the Russian battleship that is to be constructed at the Cramp shipyard, Philadelphia. The contract price is $640 a ton. The armor will be made by the Krupp process.

THE FEDERAL STEEL CO.

Since it is known that a majority of the stockholders of the companies in interest favor the consolidation, the action of the directors' committee of the Illinois Steel Co., Minnesota Iron Co. and Elgin, Joliet & Eastern Railroad at New York Tuesday, Aug. 30, virtually brings these corporations together in one. The meeting was attended by Roswell P. Flower, chairman, H. H. Porter, Nathaniel Thayer, John W. Gates, Robert W. Bacon, Don H. Bacon, A. J. Forbes-Leith and E. H. Gary. The action taken is thus officially stated by Judge Gary, who has been chief counsel in the negotiations:

"The sub-committee reported that it had been decided to organize a new company, to be known as the Federal Steel Co., under the laws of New Jersey. The capital stock will be about $200,000,000, one-half in preferred and one-half in common stock. Arrangements for the purchase of the steel plants at Lorain, O., and Johnstown, Pa., have been consummated. A majority of the stockholders of the Minnesota Iron Co., the Illinois Steel Co., and the Elgin, Joliet & Eastern Railroad Co. have already signified their willingness to sell to the new company. It is expected the new company will be ready to begin business on Oct."

The property of the Illinois Steel Co., it is stated, will be taken over at $18,650,635, the par of its capital stock, plus its $13,285,142 debentures. The Minnesota Iron Co., with $16,500,000 capital stock, and upwards of $6,000,000 surplus, will be taken at $139 a share, making its total in the stock of the new company $22,935,000. With the Illinois Steel Co. the consolidated company acquires the Southwest Connellsville Coke Co., in which the interests of the Chicago company and H. C. Frick were separated some months ago. It is expected that the output of the Southwest plant and of the subsidiary Revere Coke Co. will be increased to upwards of 1,250,000 tons a year in the near future.

The purchase of the Lorain Steel Co.'s plant at Lorain, O., and that at Johnstown, Pa., at which special work and steel castings have been the product of late, is said to be on the basis of two-thirds cash and one-third stock.

Personal.

William T. Bennie, of David Bennie & Sons, Glasgow, Scotland, was in Chicago this week on his way around the world. Mr. Bennie's trip is a combination of business and pleasure. While in this country he is visisting the more important iron, steel and nail works, and concerns making nail machinery. From Chicago, Mr. Bennie goes to Cleveland and Pittsburg. His concern is known as the Star Iron & Steel Rolling Mills & Nail Factory.

Irvin McDowell, of Chicago, who has been connected with Rogers, Brown & Co. for over a year past, and has made a trip to China, Japan and Australia in their interests, is to be connected with the St. Louis office of the same concern in the future, in the capacity of salesman. Mr. McDowell's knowledge of the iron and foundry business peculiarly fits him for such a position.

Simpson C. Leonard, of Youngstown, O., has been appointed manager of the forge department of the Michigan-Peninsular Car Co., Detroit, Mich.

Dispatches from Dumfries, Scotland, say that Andrew Carnegie has offered the town council of that place the sum of £10,000 to build a public library.

G. Spengeburger, an iron and steel manufacturer of Berlin, Germany, was in New York last week, having come to this country to investigate American methods of iron and steel manufacture.

The Pennsylvania Steel Co. is reported to have earned a portion of the interest on its consolidated mortgage bonds falling due September next, which is to be paid in scrip, and that the charges to betterments and depreciation accounts absorbed quite an item out of net earnings. In the six months an increase of several hundred thousand dollars in gross earnings has been made as compared with the same period of 1897, and something was earned for interest on the bonds as against a deficit in manufacturing cost, ahead of fixed charges, last year. Under the circumstances, however, the management has decided to avail itself of the option to pay the interest, amounting to $98,500 in scrip, convertible into bonds. According to arrangement at the time of reorganization, no further scrip payments will be made.

STANDARD FOR CAST IRON TESTS.

The first annual meeting of the American section of the International Association for Testing Materials, was held at the Engineers' Club, Philadelphia, on Saturday, Aug. 27. There were 26 members present. Among them were: Prof. Mansfield Merriman, of Lehigh University; Prof. W. K. Hatt, of Purdue University; Prof. Marbury, of the University of Pennsylvania; Gus. Henning, also representing the American Society of Mechanical Engineers, and the Council of the International Association; R. L. Humphrey, of the Philadelphia City Laboratory; P. Kreuzpointner, of the Pennsylvania Railroad Co.; Chas. T. Davies, of the Philadelphia & Reading Railroad Co.; Dr. Richard Moldenke, also representing the American Foundrymen's Association and the German-American Engineering Society of Pittsburg; Mr. Meuser, representing the New York German-American Engineering Society; W. White, of the Bethlehem Iron Co.; Wm. Webster, of the Department of Public Works, City of Philadelphia; Frederick Riehle and C. Bramwebll, of Riehle Bros. Testing Machine Co.; H. Willie, T. Schallenberger, A. W. Whitney, and A. Leslie.

Prof. Merriman called the meeting to order for the afternoon session, and after the reading of the minutes of the organization meeting of June 16, the discussion of the by-laws was taken up. Mr. Henning explained many points covering the relation of the Amercian section to the International body and with but two slight modifications, the by-laws presented by the executive committee were adopted. The appointments to the various committees were next gone over, there being one or two American members required to complete the international committees for the study of 25 problems relating to the methods of testing materials of construction. As there remained many vacancies which the executive board could not fill, suggestions were called for from the members who were acquainted with specialists in the various lines indicated, and in this way the freest scope to American work and requirements was given.

Dr. Moldenke called attention to the fact that the testing of cast iron was not specialized on the list of problems, but was made quite co-ordinate with the general study of the testing of iron and steel. Inasmuch as Mr. Henning was chairman of a committee appointed for this purpose by the American Society of Mechanical Engineers, and the speaker was similarly engaged on behalf of the American Foundrymen's Association, and as Prof. Martens was going over the same ground in Germany, it seemed a great duplication of work, if not a working at cross purposes, to some extent. This could not be better adjusted than under the auspices of the International Society. Dr. Moldenke was requested to draw up a resolution on the subject for action at the evening session. There was considerable discussion relative to the merits of testing by impact. Prof. Hatt, Messrs. Webster, Kreuzpointner, Riehle, and White giving various phases of the problems encountered. On motion of Mr. Henning, Prof. Hatt and Prof. Marbury, were appointed two members of a committee of three to investigate and report upon the present status of our knowledge on the subject of testing by impact.

A recess was taken, the members present adjourning to the Hotel Lafayette for dinner. On returning, a group picture was taken by a local photographer.

The evening session was opened at 8, and under the head of unfinished business, Dr. Moldenke presented the following: "Resolved, That the Council of the International Society for Testing Materials be requested to appoint a committee to investigate methods of testing cast iron." This was adopted unanimously. The subject for discussion which was on the regular programme was "The relation of the International Association to producers and consumers." Dr. C. B. Dudley being unavoidably absent, Mr. William R. Webster spoke for both. He gave a very earnest plea for the lessening of the number of specifications now existing and brought out the difficulties attending business dealings between America and the old world. Thus our basic steel, which equals acid, owing to the comparatively pure materials used will not be accepted in Europe for bridges and structures because they have a prejudice against it based upon their own material made from inferior stock. The International Society can do much to correct this misapprehension on their part regarding the quality of our product and thus benefit the American trade. The subject was discussed at length and from many standpoints by nearly all the members present, each adding something to the general interest by recounting his personal experiences. The next subject discussed was "In what manner will the adoption of standard specifications improve industrial methods and processes?" Prof. Carpenter being absent, Mr. Gus. Henning spoke for both and gave some interesting experiences with prominent industrial concerns of this country who are invading foreign markets. Here again nearly all the members present joined in the discussion, the range of the thoughts expressed being widely extended. Under the head of miscellaneous discussions Mr. Kreutzpointner pointed out with great force that to properly equip this country for the coming struggle for supremacy in world markets we must not neglect to educate our youth in all the industrial branches where there is competition. The meeting closed late and was voted exceedingly interesting and a very successful convention. All members look forward with pleasure to renewing acquaintances at next year's gathering.

THE TIN PLATE MARKET.

The past week has shown a decidedly stronger market and some heavy contracts have been closed at prices fully 5c a box on coke tins, over the bottom prices of three weeks ago. Many of the mills have actually advanced their quotations 7½c to 10c a box and others have withdrawn from the market entirely on far futures. The spot demand continues good and stocks are small at mills or in dealers' hands. The advance in price of steel and pig tin is being felt and is the cause of the advance in tin plates, rather than the renewed rumor of trust negotiations, which have been current during the past week. Messrs. C. S. Trench & Co., New York, issue the following statistics under August date:

American production of tin plate and black plate for three years, in boxes 100 lbs., 14x20:

	1896.	1897.	1898.
January,	250,880	370,384	479,820
February,	258,272	381,360	536,686
March,	272,570	426,103	540,300
April,	336,896	434,872	546,908
May,	338,688	479,360	578,572
June,	376,724	480,144	629,564
July,	245,840	437,554	642,540
	2,079,870	3,009,777	3,954,390

The above figures are the best obtainable and have been carefully compiled; they are believed to be substantially correct and accurate. Note that each month shows an increase except July, 1896, and 1897. Then the scarcity was noticeable and the decline in prices temporarily arrested. The increased output during July, 1898, has been accompanied by lower prices; but so far as we can observe there has, as yet, been no marked increase in stocks, and apparently all the output has been sold. Notice the percentage of increase during 1897 and 1898 over 1896 by months:

	1897. Per cent.	1898. Per cent.
January,	47 8-10th	101 5-10th
February,	47 7-10th	117 6-10th
March,	56 3-10th	107 2-10th
April,	29 1-10th	69 8-10th
May,	41 6-10th	81 2-10th
June,	27 5-10th	73 7-10th
July,	78	171 5-10th

The total receipts of tin plate and black plate during seven months in 100 lbs. 14x20 boxes:

1896.	Per cent.	1897.	Per cent.	1898.	Per cent.
Domestic—					
2,070,870	54	3,009,777	69 5-10th	3,954,390	79 2-10th
Foreign—					
1,773,726	46	1,316,607	30 5-16th	1,032,214	20 8-10th
3,853,596		4,326,384		4,986,704	

Number hot mills working on August 15: 1896, 170; 1897, 189; 1898, 253. Number of mills building, 54 to be finished next month, making 307 hot mills after October, 1898, increasing domestic production over 20 per cent. Average number of mills, 1897, January to July inclusive, 183, produced 3,009,777 boxes 14x20 100 lbs., 16,447 boxes per mill in seven months. Average number of mills, 1898, January to July inclusive, 234, produced 3,954,390 boxes, 14x20 100 lbs. 16,900 boxes per mill in seven months.

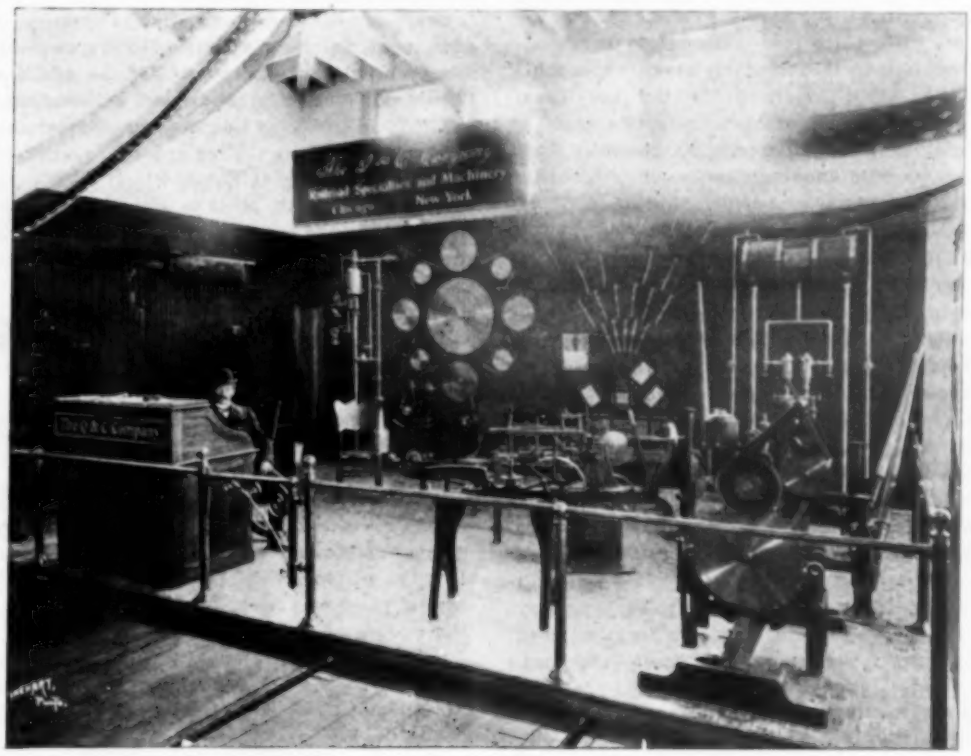
OPEN-HEARTH STEEL IN GREAT BRITAIN.

The official figures just published show that the production of open-hearth steel ingots in the United Kingdom in the first six months of 1898 was 1,305,771 tons, against 1,353,768 tons for the coresponding half of the previous year The decrease of 48,000 tons is said to be due mainly to the stoppage of one steel works in Scotland and to the interference of the coal strike with the industry in Wales. An increase is reported in the production of plates, angles and bars, along with the decline in blooms and billets, these figures reflecting the imports of raw steel from the United States and Continental countries. The total of plates was 545,247 tons, against 519,500 tons in the first six months of 1897; of bars, 255,558 tons against 236,241 tons; of castings, 19,318 tons against 28,283 tons, and of rails, 19,170 tons against 12,518 tons. The growth of the steel shipbuilding industry has caused the largest expansion of open-hearth steel manufacture in the North-East Coast or Cleveland district, which now leads all others, though until 1893 Scotland was well in the lead. The *Iron and Coal Trades Review* presents, in connection with the figures, this comment on the development of the open-hearth industry in Great Britain:

"If we go back to the year 1879, we find that the total quantity of open-hearth steel produced in that year was 175,000 tons, or less than a seventh part of the quantity produced in the first half of the current year. South Wales was then the leading district, and had an output of 85,000 tons, against an output of 172,584 tons for the first half of the current year. Scotland, on the other hand, although destined within the next 20 years to produce close on 790,000 tons a year, did not produce more than 50,000 in 1879, and, more strange still, the Cleveland district, which now produces close on a million tons a year, then only produced about a thousand tons. It was at that time believed that ships for all purposes would continue to be made of iron, and that Bessemer steel would continue to hold the field for railway requirements, so that it almost looked as if tin plate bars and the Sheffield trade were the only two openings for the open-hearth product. Nevertheless, the Sheffield trade has not nearly made the same quantitative progress as have other departments that were then so much 'in nubibus' that only a few men of unusual foresight believed they would come to anything in the future. In 1879 22 firms had embarked on the open-hearth steel industry, and had constructed altogether 102 furnaces. We have no record of the number of those furnaces that were in operation during the year, but the average annual output per furnace erected was not more than 1,700 tons, while the average output of the 310 furnaces in operation during the first half of the current year was at the rate of about 8,400 tons a year, and a number of them considerably exceeded that figure.

"Again, in 1879, few furnaces exceeded a capacity of eight tons, and most of them were of five tons capacity or under. In that very year indeed, a firm at Motherwell was supposed to be doing almost a rash thing in undertaking to build four 10-ton furnaces, and the steel-making world was astonished to learn from the late Mr. A. L. Holley, that at St. Chamond a 20-ton open-hearth furnace had been constructed on the Pernot system. In the interval, we have gone from 5-ton to 50-ton furnaces, with some few between 50 and 100 tons, while one in the United States claims to be over 200 tons. Steel manufacturers are now seriously discussing whether it would not be profitable to use furnaces of 100 tons as a regular thing, and although there are certain admitted difficulties in the way, none of them are so really insuperable as to render this a practical movement in the near future.

"It can hardly be necessary to add that the open-hearth steel process of to-day is largely a product of the movement which has resulted in the almost complete displacement of iron by steel as a shipbuilding material 20 years ago, probably not more than 20,000 tons of steel plates and angles were produced in the country by the open-hearth system, if so many. To-day, our output of open-hearth plates and angles is at the rate of about 1,000,000 tons a year, of which fully three-fourths are employed in our own shipbuilding industry, itself the subject of an equally astonishing expansion and process of change. In the future the open-hearth steel industry of this country will have to buckle on its armor to meet increased competition from the Continent and the United States. We have faith in its ability to hold its own, and to adapt itself to the further changes which mechanical improvements or industrial conditions may demand."



AN OMAHA EXHIBIT.

The half-tone illustration above gives a view of one of the most creditable exhibits by machinery firms, at the Trans-Mississippi International Exposition at Omaha. The Q & C Co., of 700-710 Western Union Bldg., Chicago, manufactures an extensive line of railway supplies and special machinery. Among the best known of their manufactures, in the general shop trade, are the Bryant metal sawing machine, the Q & C shop saw and the Q & C Scott boiler feeder. These and other specialties appear prominently in the illustration.

IRON ORE PRODUCTION IN 1897.

Mr. John Birkinbine, of Philadelphia, the well known engineer, and the iron ore statistician and expert of the Mineral Resources Bureau of the United States Geological Survey, spent a portion of the past week in the Cleveland district. Speaking from the data which will be embodied in his annual review, now ready for transmittal to Dr. David T. Day, Mr. Birkinbine furnished *The Iron Trade Review* the following interesting facts concerning the iron ore production of the United States in 1897:

The total output of iron ore in this country in 1897 was greater than ever before, exceeding 17,500,000 gross tons. This is an increase of 1½ millions, in round numbers, over 1896. This increase was practically the gain in the production in Minnesota. The mean production in the last decade has been about 14,000,000 gross tons. Of the 17½ millions produced in 1897, over 80 per cent was red hematite. The country produced as much red hematite alone last year as the total production amounted to in 1889. Production of brown hematite was about 2,000,000 tons; of magnetite, 1,000,000 tons, while of carbonate the total was less than 100,000 tons. The States having the largest production were as follows in the order of their standing: Michigan, 6,000,000 tons; Minnesota, 5,600,000 tons; Alabama, 2,100,000 tons; Pennsylvania, 750,000 tons; Virginia, 710,000 tons. In Michigan the average of production has changed very little since 1889. Minnesota increased steadily from 865,000 tons in 1889 to nearly seven times that in 1897. Alabama has stood nearly still in the past three years.

Nine groups of mines produced over 5,000,000 tons; five others exceeded 2,000,000 tons, making 7,000,000 tons from 14 groups—practically from 14 mines.

LOWEST PRICES OF IRON AND STEEL.

The current issue of the *Bulletin* of the American Iron and Steel Association refers to four periods of particularly low prices for iron and steel in this country since the close of the civil war, the first occurring after the Jay Cooke panic of 1873, the second in 1884 and 1885, the third from 1891 to 1895, and the fourth from 1896 to 1898. The article continues:

"The lowest quoted price for No. 1 foundry pig iron at Philadelphia in the first and second periods above mentioned was $16.50, in November, 1878. In 1893 the price of No. 1 foundry fell to $13.75, this quotation ruling in November and December of that year. In April, 1894, the price fell still further to $12.50, at which it remained until January, 1895, when there was a further decline to $12, at which point the price remained during the early months of that year. About the middle of 1895 prices again advanced, reaching $14.50 in September and October. In November and December of the same year prices again fell, the decline continuing practically throughout the whole of 1896 and 1897 and the first seven months of 1898. In July, 1898, the price quoted was $11.25, which was 75 cents less than the low price ruling in January, 1895.

"The lowest quoted price for gray forge pig iron at Pittsburg in the first period was $16 and in the second period it was $14. In the third period prices declined to $9.40 in April, 1894, recovered to $10.15 in September, 1894, fell to $8.90 in March, 1895, rose to $13.65 in September of the same year, fell to $9.40 in August, 1896, and dropped to $8.25, the lowest price on record, in June, July, and August, 1897. In October, 1897, prices advanced to $9.75, fell to $9 in December, advanced to $9.25 in March, 1898, and fell to $9.10 in July.

"The lowest quoted price for Bessemer pig iron at Pittsburg after the panic of 1873 was $19.50, quoted in May, 1878. In the second period the lowest price was $17. In April, 1894, the price fell to $10.45. In the following month the price rose to $13.50, owing to a prolonged strike in the Connellsville coke region, but the decline which followed touched $9.95 in January, 1895. Owing to the advance in the price of coke and to the boom of 1895, quotations advanced to $17.50 in September, falling after the collapse of the boom to $10.40, in August, 1896. In November the price advanced to $12.50, fell to $11.30 in December, and continued to fall until $9.25 was quoted in May, 1897, the lowest price on record. Prices subsequently advanced to $10.75 in October, 1897, fell to $10 at the close of the year, rose to $10.40 in March, 1898, and fell to $10.25 in July.

"The lowest quoted price for old iron rails at Philadelphia was $11, in June and July, 1894.

"Best bar iron at Pittsburg touched a lower point in the fourth period than in any of the other periods, the quoted price in June and July, 1897, having been 95 cents per 100 pounds.

"Steel rails also touched their lowest price in the fourth period. In February, 1897, sales were made at Pittsburg, at $16, and at perhaps even lower figures. Subsequently, in the same year, the price advanced to $18, the present quotation.

"Steel billets are not embraced in this summary, because quotations are not accessible for the first and second periods. The average monthly price of Bessemer steel billets at Pittsburg in January, 1892, was $25, while the average monthly price in July, 1897, was $14. The lowest quoted price was in May, 1897, when sales were made as low as $13.85."

INDUSTRIAL NOTES.

Among improvements contemplated by the Cambria Iron Co. of Johnstown, Pa., in the coming year is the erection of a $500,000 open-hearth steel plant, adjoining the structural mill. Improvements in the rail mill and other departments of the works are also planned.

The Clinton mills, South Side, Pittsburg, with their new equipment, will be in operation in the next few weeks. The Riter & Conley Co. has completed the addition to the plant. Considerable new equipment will be installed.

The Carnegie Steel Co. has just completed two large orders for export to Japan. They are for 3,000 tons of structural steel for a building at Tokio, which will be four stories, and of unusual strength, so as to withstand the severe typhoons which sweep the country, and for 2,000 tons of steel rails for the Bulo Chew Railway. Shipment was made via New York to avoid heavy freight charges in crossing the country to the Pacific Coast.

The new Garrett rod mill, which the Shoenberger Steel Co., of Pittsburg, is about to build will be ready for operation in April, 1899. The new mill will stand on ground now occupied by the company's 16-inch bar mill. This and several adjoining buildings will be torn down. The product will be rods for bolts, from one-eighth inch diameter to small rounds.

Within a year it is expected that Lakeside, a suburb of Racine, Wis., will have from 500 to 1,000 men employed in its manufacturing establishment. The Lakeside Malleable Iron Co. employs 100 men. The Racine Malleable Iron Co., whose plant was burned, will rebuild at Lakeside, and the Pierce Engine Co. will build a plant.

The Hardie-Tynes Foundry & Machine Co., Birmingham, Ala., has the contract to furnish the air compressor for the Sloss Iron & Steel Co.'s brown ore mines at Leeds, Ala.

The Carnegie Steel Co. made a shipment of 4,716 tons of armor plate last week for the Russian Government. Some rails for the Trans-Siberian Railway were also part of the shipment.

Iroquois Furnace, South Chicago, of which Forster, Waterbury & Co., the Rookery, Chicago, are sales agents, has been put out of blast for relining and repairs, after running nearly two years and a half. Changes will be made which are expected to increase the capacity of the furnace

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The capacity of the converting mill at the Edgar Thomson works of the Carnegie Steel Co. is being enlarged. A battery of boilers has been demolished and in its place will be erected the largest blowing engine ever constructed. It will enable the converting mill to blow three heats at one time as against the present capacity of two 20-ton heats at one time. The second finishing mill at the same works has been rebuilt, and now has three trains of rolls capable of rolling rails up to 63 pounds per yard.

Some excellent work in rapid unloading of ore has been done at the Conneaut docks of the Pittsburg, Bessemer & Lake Erie Road this season. The record for the year was broken on Aug. 30, when in 12 hours' time 13,247 tons and 1,030 pounds was transferred from vessels to cars and dock piles. The equipment at this dock consists of 15 ore conveyors and four groups of three machines each, of McMyler rapid ore unloaders.

WATCH AND CLOCK MAKERS' POWER PRESS.

The press shown in the accompanying cut has been brought out by the E. W. Bliss Co., owner and operator of the Stiles & Parker Press Co., 6 Adams st., Borough of Brooklyn, New York City. It has been designed to meet the demand for a machine for accurately operating small sub-press dies and tools. There are several styles and sizes, all especially adapted to the manufacture of watch and clock parts and articles of similar nature. While essentially like the regular Stiles presses, it is made with considerable more distance between the bed and the slide, so as to accommodate sub-presses. A bridge bolster such as appears on the floor in the illustration, is used for shortening this distance, if ordinary cutting or forming tools are to be operated in the press. The machine is frequently furnished with an adjustable stroke, permitting variation in the movement of the slide in accordance with the construction of the different sizes of sub-presses. There is also a positive stop attachment, making it impossible accidentally to make two strokes in succession, if the operator should forget to take his foot off the treadle.

Besides using an overhanging press, as shown in the illustration, for operating sub-presses, a straight-sided or arch-frame press is often used. Sub-presses are now employed almost entirely for delicate dies required in the manufacture of watch and clock parts, etc. These dies are so arranged as to cut the outside and perforations of the pieces simultaneously. The advantage of sub-presses is in enabling the operator to keep the dies always correctly adjusted for the work.

THE Shenango Machine Co., Sharon, Pa., will enlarge its plant, and double its capacity.

NEW CUTTING-OFF TOOL.

A new cutting-off tool is being placed upon the market by Armstrong Bros. Tool Co., of Chicago, well known as makers of an extensive line of tool holders for metal working. This tool, which is shown in the accompanying cut, is based upon the same mechanical and economical principles which have attracted favorable attention to the Armstrong tool holders, namely, an inserted cutting blade of self-hardening steel, supported by a permanent holder of drop forged steel. The blades are beveled on both sides, thus insuring the proper amount of clearance necessary for a clean cutting tool. They require grinding on the cutting end only. The bolts and holder are hardened and will stand constant use for years. The cutting off tools will be made in seven sizes suitable for all classes of work. The manufacturers, whose address is 106 and 108 West Washington st., Chicago, will send descriptive and illustrated catalogue on application.

Filling Cracks in Castings.

Many methods for closing cracks or pores in cast iron have been devised. Chemical or other products, such as sal-ammoniac, are often used to cause the formation of iron salt, easily oxidizable, which in a short time gives a certain quantity of hydrated oxide of iron. This is made use of very often to stop up leaks which develop in metallic cylinders. This method is, however, a somewhat lengthy one, several days being oftentimes necessary to obtain satisfactory results; that is to say, entire absence from leakage. A method of closing cracks or pores has lately been devised by M. A. Demalght, of Brussels. The cylinder is filled with a certain quantity of perchloride of iron. The liquid is then compressed until globules appear on the external surface. The cylinder is then impregnated with perchloride of iron right through, as regards its thickness. Any perchloride in the cylinder is then emptied out, the cylinder being then wiped until the polished surface is again made brilliant.

THE announcement of F. W. Wood, president of the Maryland Steel Co., Sparrow's Point, Md., that Andrew G. Wilson, superintendent of the Harlan & Hollingsoworth Co., of Wilmington, Del., had resigned the latter position to accept that of manager of the ship yard of the Maryland Steel Co., presumably removes all doubt that a determination has been reached to resume the operation of the plant in question. The Sparrow's Point yard may be made one of the best in this country, and with the avowed policy to secure the most efficient staff possible there is no reason to doubt that it will secure a considerable portion of the naval and commercial work which will result indirectly from the war.—[Marine Review.

ROGERS, BROWN & Co., with offices in most of the large cities, have been made exclusive sales agents for the Wellston (O.) Iron & Steel Co., manufacturer of foundry and soft grades of pig iron and malleable Bessemer. The company has two stacks, both in blast at present.

THE Portsmouth, O., *Blade* has just issued an "industrial edition," giving descriptions of the important industries of the city The manufacturing interests of the city include some of the most important of Southern Ohio, and are quite diversified. Among the concerns described are the Burgess Steel & Iron Co., the Portsmouth Stove & Range Co., the Ohio Stove Co., Neill Stove Co., Portsmouth Fire Brick Co., Webster Fire Brick Co., and the Sciotoville Fire Brick Co. The issue is gotten up in good style, is handsomely illustrated, and is a credit to the town and the publishers.

BENEFIT FUNDS IN THE LAKE SUPERIOR IRON MINING INDUSTRY.*

BY WM. G. MATHER.

In the earlier days of Lake Superior iron mining, as with other industries of the country at large, benefit funds and special organizations and methods on behalf of employes were not common. The first mining work in Lake Superior was prosecuted either by corporations popularly represented as without souls, a saying which doubtless had some foundation of fact, though fortunately such facts are becoming less apparent, or by explorers and practical men who by their natural ability and energy rose from the ranks of miners and who often have evinced a marked absence of faith in the usefulness of making more comfortable that lot which they themselves endured without complaint, and whose limitations they successfully overcame.

In earlier times when industrial plants were the property of one man, or of two or three associated as partners, and when the owner himself was frequently the manager, he lived closer to his men and a bond of kindliness and interest was often in effect, which filled the function of the benefit methods now used, and which naturally disappeared when corporations arose, managed often by men whose principal financial interest in the company was their salary. As industry becomes more complex, and large organizations more often the rule, especially in the production of raw materials, greater attention has been paid to the details of management. The opportunities of the explorer and stock company floater are less than they were 20 or even 10 years ago, but the chances of steady work for the employe and employer are much better, since the latter has become stronger and has accumulated large reserves of capital, skill and experience; made connection with the consumer and gathered together a good organization, thereby fitting himself to tide over hard times without greatly curtailing operations, and by producing a greater volume at a smaller unit cost, to better withstand the extremely low prices which leave a margin of profit per unit astonishingly small, if any.

The Lake Superior mining industry is now in the era of the large corporation or employer whose organization is as costly as it is efficient; whose fixed expenses are large and whose aim must therefore be to work regularly, to produce this year as much if not more than last year, so that these fixed charges per ton may not increase but decrease. The employer cannot now easily reduce his cost when prices and demand are depressed; a complex organization (necessary with a large business), cannot conveniently nor economically be suddenly adapted to a decreased output; men cannot be discharged now and new ones employed later without impairment of system, discipline, and efficiency; taxes will not grow less since large communities have grown up in what was once a wilderness.

To illustrate this tendency, in Lake Superior iron ore, I subjoin three tables showing the number of employing interests, the average product of each and the total product in 1882, 1893 and 1897.

District.	1882.			1893.			1897.		
	No. of Employers.	Product.	Product per Employer.	No. of Employers.	Product.	Product per Employer.	No. of Employers.	Product.	Product per Employer.
Marquette ...	41	1,829,394	44,619	22	1,835,913	83,449	18	2,715,035	150,835
Menominee ..	25	1,136,018	45,440	22	1,466,197	66,645	14	1,937,013	138,358
Gogebic	.....	.....	.....	18	1,329,385	73,854	15	2,258,236	150,549
Vermilion.....	.....	.....	.....	2	820,631	410,310	3	1,278,481	426,160
Mesabi	.....	.....	.....	11	613,620	55,783	13	4,280,873	329,298
				*75			*63		
Total.....	66	2,965,412	44,930	72	6,065,716	84,246	60	12,469,637	207,827

*This figure differs from the total named below, because there are employers operating on more than one range; therefore, the grand total number of separate employers is less than the addition of the totals of each range. The figures as to number of separate employers are not put forth as absolutely exact, but are close enough to make reliable deductions.

The year 1882 is only fifteen years distant, and yet Marquette and Menominee were then the only producing districts. In 1893 all the present five producing districts first appeared and 1897 is the year of largest output. Compare 1897 with 1882, and there are fewer separate employers by six, or 10 per cent; a larger total output by 9,504,225 tons, or 320 per cent. A larger output to each employer by 162,897 tons, or 360 per cent.

With these changes in the tonnage handled by the employer, and the reduction in price from $9.50 per ton at Cleveland in 1883 to $2.35 in 1897, for the same grade of ore, has also come a greater, and we hope a steadier volume of business which enables the large employer operating on a huge and complex scale to run regularly and thus to keep down his fixed charges per unit and to introduce expensive but better methods and machinery and produce his ore cheap enough to sell it at prices which not only stimulate the home demand but carry our iron and copper all over the world, thus maintaining a volume and steadiness which largely counterbalances the lower prices.

The object of the producer is therefore to run full and steadily in order to keep down his costs and obtain a proper return for his investment. We have then arrived at this stage of affairs: First, low prices and expensive managing organizations with high fixed charges needing a regular and large output, and second, a knowledge that the extent of our deposits and future market prospects are of a kind to justify large expenditures for the most efficient plant and best organization.

Now the main factor in producing ore is labor, averaging about 70 per cent of the total cost on cars at the mines. Therefore to operate steadily and economically it is of importance to understand what conditions will give a sufficiency of efficient and competent men, and how to keep those we now have, and how also to make them more capable. Some of the conditions are good health, intelligence, contentment, and industry, and these should be encouraged, while sickness, accidents, ignorance and restlessness are in opposition to the above and should be overcome as soon as possible. Relief and pension funds, health service, good housing, workingmen's life insurance associations, co-operative distributive stores, schools of all kinds, schemes of recreation, etc., have been fostered in a wonderful degree by some employers, principally in Europe, to further the good and prevent the bad conditions above named.

The observations I am about to make with reference to our mines are intended to serve as suggestion rather than criticism, for I believe it to be true that the condition of the people in the Lake Superior mining region is far above the average of other mining regions, and that many of our employers are thoroughly alive to their responsibilities. A visit to some of our older towns will prove this point, and our great and fortunate copper brothers have gone farther in this line than the rest of us, realizing their obligations in return for the vast stores of riches which have come into their possession.

Relief and Pension Funds.

We have made provision for financial help, (viz., our benefit clubs), in sickness and death, and for medical treatment. To ascertain the details of the relief and medical systems, I recently addressed a printed set of questions to nearly all the mines in the Lake Superior region, and to some of the coal mines of Ohio and Pennsylvania. Out of 46 such circular letters sent out, 11 made no response; 12 replied that they used no means of medical or financial relief, four have no benefit club, but provide for medical service; 19 have both systems and made courteous reply to all questions. Seventeen of the circulars went to large coal mining companies, of whom nine replied but only two of these make provision for either financial or medical relief. Consequently nearly all of my data is connected with Lake Superior mines. The general custom seems to be to collect from 25 cents to 50 cents each month from each employe, to which total sum the employer adds an equal amount. This is generally distributed to the men who are disabled by accident, at the rate of from 75 cents to $1 a day while so disabled. In case of death from accident, the sum given to the widow or heirs varies from $200 to $500; varying sums are also given in case of disabling injuries that are not fatal. In some cases, this fund is supplied solely by collections from the men, but I am glad to be able to say that these cases are not in the majority.

* President's address at the annual meeting of the Lake Superior Mining Institute, Aug. 16, 17, and 18, 1898.

Medical service is generally secured by collecting $1 a month from each man and handing it over to a body of physicians, who, without further charge, furnish adequate service, medicine and hospital accommodation when necessary, not only to the men but to their families. The employer contributes nothing, but is supposed to insure to the men a proper service for the money collected. The system followed in collection and distribution of these funds is chiefly to be commended for its simplicity. It might however, be criticized, first, for collecting the same amount from each man, married or single, and irrespective of the wages he receives. Second, for the fact that with a few exceptions, no reports are made of the sums collected and disbursed, and no printed set of rules distributed. Third, that with few exceptions the men have no voice in the distribution of the money and no representation on the committee.

I have heard a defense made that the men are indifferent and would not serve on a committee, and do not seem to care whether or no there be any benefit fund. It might be replied that the Pennsylvania and Baltimore & Ohio railroads, some of the best representatives of our copper and iron mines, and the finely organized and prosperous coal mines of France, Belgium and Germany, publish rules and reports, and that the railroads and foreign mines above mentioned have a graded system, proportioned to wages received, and furthermore, their employes are fully represented on all committees dealing with these matters.

Housing.

Has sufficient care been given to the housing of our mining population? Bad sanitary arrangments and too much crowding will cause sickness and ill health. Too high rents conduce to crowding and therefore to bad sanitary conditions. Will it pay the employer to make greater efforts and even contribute money for the purpose of having good substantial houses with good sanitation, provided with grounds for flower and vegetable gardens, at a minimum rent, especially in our newer districts?

This feature is looked after with what seems to us wonderful care and expense by the mining companies in France, Germany, Belgium and England, who not only provide well arranged tenements and separate houses at low rent, but make especial and most liberal efforts to induce their employes to own their houses. This kind of thing tends strongly to make the employes healthy, contented and averse to frequent change of residence and employer. Even in populous communities, suitable houses may be, but seldom are provided by private enterprise, as the tendency on the part of such owners is to get the most for their money without regard to the relation that the inmate bears to his occupation or employer.

In this form of benefit may be included: First, the provision that the miner's house be not far from his work so that he will not be over tired on arriving at the mine. Second, that better and more comfortable and cleaner changing or dry houses be provided not too far from the mine mouth, for otherwise men will contract colds, going to and fro in wet clothes, particularly in cold weather; also, facilities for bathing at small cost; cleanliness and proper clothing would prevent much sickness.

Physical Condition of the Mine.

Another form of benefit for preventing sickness, etc., is a good condition of affairs underground. It pays to take every precaution to prevent men from being injured, especially when men are scarce.* It also pays to look after sanitary conditions which indirectly affect the efficiency of the miner; for example, good ventilation, avoidance of anything causing bad odor, lessening the dry dust inhaled by the worker, the fatigue of climbing ladders, etc., all of which will tend to the prevention of sickness and exhaustion, which either impair a man's working capacity or lay him off entirely for a greater or less time.

*Tables Showing a Comparison of Several Districts with Respect to Fatal Accidents per 1,000 Men Employed.

Marquette County, 1889–1894, 6 years,	3.84
Gogebic County, 1888–1894, 7 years,	5.60
Menominee and Dickinson County, 1888–1894, 7 years,	4.55
Houghton County, 1890–1894, 5 years,	3.51
Pennsylvania Anthracite Coal Mines, 1897,	2.83
" Bituminous " "	1.68
Belgian Mines, 1880–1888, 8 years,	2.13
France, " "	1.57
Great Britain, " "	1.94
Prussia, " "	2.96

The above Lake Superior figures are taken from a report of J. Parke Channing. Pennsylvania figures are from the State Mine Report. Foreign figures are from Foster's book on "Ore and Stone Mining."

Medical Service.

Another form of useful benefit is the efficiency of means for the recovery of men from accidents or sickness; the sooner they get back to work, the better for the employer. As was mentioned above, many of our mines collect money from the men and take care that it is paid over to skillful and conscientious physicians who provide without further charge, medicine, service and hospital accommodations. But is enough being done to make sure that the man not only gets back to work quickly, but that the cost of his service is proportionately borne by those most generally in need of medical aid? Might it not be worth while to re-examine our system and ascertain if we are charging the right sum, needed for proper service? If it is being collected fairly, in other words, should all pay alike? Is the hospital properly constructed and managed, airy, clean, attractive; is there an ambulance service and proper facilities and comforts for convalescents, e. g., a garden or corridors to walk or sit in arranged for summer and winter?

Education.

Intelligence and aptitude for the work being done, and knowledge as to the best way to do it, is a valuable quality both for the miner and the employer. Is it not needful therefore that the employer interest himself in the schools, and take care that good teachers are provided from a moral and intellectual standpoint; a good practical curriculum followed and that the school buildings are in a good sanitary condition?

We already have good public schools in Lake Superior, and the employer has always willingly paid the high taxes necessary for their support. But, would it pay to introduce some features more practical and appropriate to a miner's occupation; for example, lectures, and classes of instruction in the principles and the practical art of mining; in the geology of the region, on how to handle men, on the nature of fuel, the steam engine, mining machinery, etc.? Would something of this kind tend to train up for us better foremen and shift bosses, mining captains, carpenters, machinists, brakemen, engineers, pump men, timber men, clerks and accountants, and would it be better to train them right up from our own boys who are growing up in our mining towns, or have we already got an abundant supply of good foremen, shift bosses, mining captains, etc.? Why could not our mining school do something in the line of establishing a school or department for boss miners, as I believe is done by mining schools in France? It seems to me unfortunate that the ranks of our employes are not more largely recruited from the sons of those now working. The occupation, or trade, as I think it is worthy of being called, of a mine employe, ought to be as respectable as that of a railroad employe, or of a store clerk, and yet our young men apparently are not of this opinion. Our own attitude is perhaps partly to blame for this situation. A skilfull, honest, sober, industrious miner is the most useful man in our communities. He deserves corresponding consideration, and if he gets it, there is every reason for our young men adopting the miner's trade, as their environment would naturally influence them in that direction. The great mining corporations of Europe apparently recognize this point, and by their schools and apprenticeship system keep their ranks constantly filled from the boys in their midst, who appreciate the advantages of steady employment and all the care taken by their employers to make their surroundings safe, healthful, pleasant, and their condition and that of their families respectable and independent. Perhaps a little benefit money and care applied to this kind of business would pay the employer. Then, how about the women? We want married men in our employ, because they do not change about from one place to another, as is the habit of unmarried men. Would it pay to help on the cause of instruction for women and girls in making and repairing clothing, housekeeping, simple gardening, cookery, nursing, plain sewing, embroidery, washing and ironing, and all sorts of housework, helping

them not only to keep their houses clean and attractive, to prepare good as well as cheap meals, to make, in other words, happy homes, but also to earn an honest living when necessary. Then there are many forms of recreation worthy of a little help from the company, both of service and money. Possibly the introduction of some such features of education would be attended with but little extra expense, as in some cases they might be substituted for some less useful branches now taught in our public schools. At any rate the experience of others shows that the results justify the cost.

In pursuing any of these methods for aiding and improving the employes, the employer must not be too prominent. It seems singular that Europe should be able to set us an example in this respect. I cannot but think that the systems pursued by many of our mines, of not co-operating with the employe in the collection and distribution of funds, is worthy of censure. As illustrative of the principle generally followed by European mining companies, I quote from a report of an old and very prosperous zinc mining and smelting company in Belgium, employing over 6,000 men in a half dozen or more separate establishments.

Two considerations which too often are neglected are absolutely necessary in order to insure the normal operation of these funds and prevent their disaster.

The first consists in keeping an exact account of present and especially of prospective expenditures and in providing resources and the necessary reserves.

The second consists in avoiding the systems of the management of the funds by the employer alone or by the employes alone, in favor of a mixed system. In that way only can workingmen be interested in the management, and the necessary control by the employer be at the same time exercised.

In these rambling thoughts I have endeavored to emphasize the value to the employer of getting the employes' best work during all the time he is under pay. We pay for 10 hours, but if, for example, on account of an unfair system of handling your relief and medical funds, the miner be dissatisfied, or if owing to a house with bad drainage, for which he pays too high a rent, his body and purse be enfeebled, then he will probably only give an equivalent of nine hours' work.

Every time there is an accident to a man or machine, you suffer a loss, and these accidents may be lessened by having more intelligent and contented men. A man through stupidity or fatigue, or hopelessness, walked into a shaft to his death the other day in a certain mine, and it cost the company, by reason of the loss of time (for the custom in Lake Superior is that the mine lay idle between the time of a fatal accident and the burial), and from payments from the benefit fund $535.24, plus $250, from the men's fund, total, $785.24.

Still, the best of men will get sick or hurt some time and then you want him to recover quickly so as not to lose his time. Your medical service attends to that, and it will pay to have it efficient. Even when the man is off work and not under pay, you are losing the product which would help to pay fixed charges. The aggregate result of all these troubles is, I am sure, more of a loss, especially in the case of a big mine, than is generally realized. For example, if the average product for the whole force per man per day is three tons for 10 hours, and his wages are $2, and if each ton nets a profit of 25 cents, then for each hours work he gets 20 cents and produces about one-third of a ton of ore, which nets a profit of about eight cents. Now then, if he gets paid by the day, and owing to some of these conditions he only gives nine hours good work, you are losing eight cents a day. Work this out on a basis of 500 or 1,000 men, and the result will be a respectable sum. Remember also that every ton of daily product lost increases the fixed charge cost on the remainder of the product. Even if you take as an illustration a clerk or time-keeper who is not a direct producer, I contend that it is just as important to get the best work his healthy body and intelligent mind and cheerful disposition can give, and to get it right along for years without interruption caused by illness or accident, and slow recovery therefrom, or by going away to try another place for a change. The actual cash cost of the systems now most generally used reaches a respectable figure, as the following statement will show, compiled from the 1897 reports of a representative iron mining company, employing an average of 785 men:

Payments from benefit fund for sickness and death,	$ 6,225
Estimated amount collected for medical service,	9,084
Total,	$15,309

The proper collection and expenditure of such a sum deserves careful attention. Other estimated losses to the company, by reason of accidents to men and plant during the same year are as follows:

Tons lost, 27,669; average profit on same (25c),	$ 6,917
Extra cost of product by reason of reduced output,	7,068
Total,	$16,985

The 1897 maintenance and repairs cost was $17,329, a part of which was doubtless due to the above accidents. Then consider the possible loss of profit caused by men not doing effectively a full day's work, and in these days of close margins the above figures should command attention, and bring to mind the proverb that "an ounce of prevention is worth a pound of cure."

To any one desirous of knowing what is being done on these lines by others, I would refer him to a text book of "Ore and Stone Mining," by C. LeNeve Foster (for English conditions). The bulletins of the Department of Labor, edited by Carroll D. Wright, U. S. Commissioner of Labor, Nos. 3, 4, 5, 6, and 7 (for conditions existing in France, Belgium and Germany). The reports of the relief departments of the Pennsylvania and Baltimore & Ohio railroads and to that most interesting establishment of the National Cash Register Co., at Dayton.

The above thoughts have been set forth solely on the supposition that it might pay mining companies and employers in these days of large operation to pursue more thoroughly some of these methods from purely a selfish and pecuniary point of view. I would not like to close, however, without bearing witness to the feeling that upon us who have been more favored by education and opportunity for attaining success in the struggle of life than has been vouchsafed to many of our employes, there rests that obligation so well expressed by the words "Noblesse Oblige."

Machinery Equipment of a Battleship.

Even after a visit to, and a thorough inspection of, a modern battleship in port, one carries away but a faint idea of the intricacy and quantity of the contained machinery, and none at all of the absolutely requisite amount of labor and material that is continually being expended in order to keep the ship in a state of readiness and efficiency. Just as the great enterprises in commercial life indicate but little to the general public the details of the toil and study which preserves them in permanently successful operation, so here it is not in line with the attitude of prowess to parade the anxious oversight and the incessant exertions demanded by the internal requirements of a man-of-war in service.

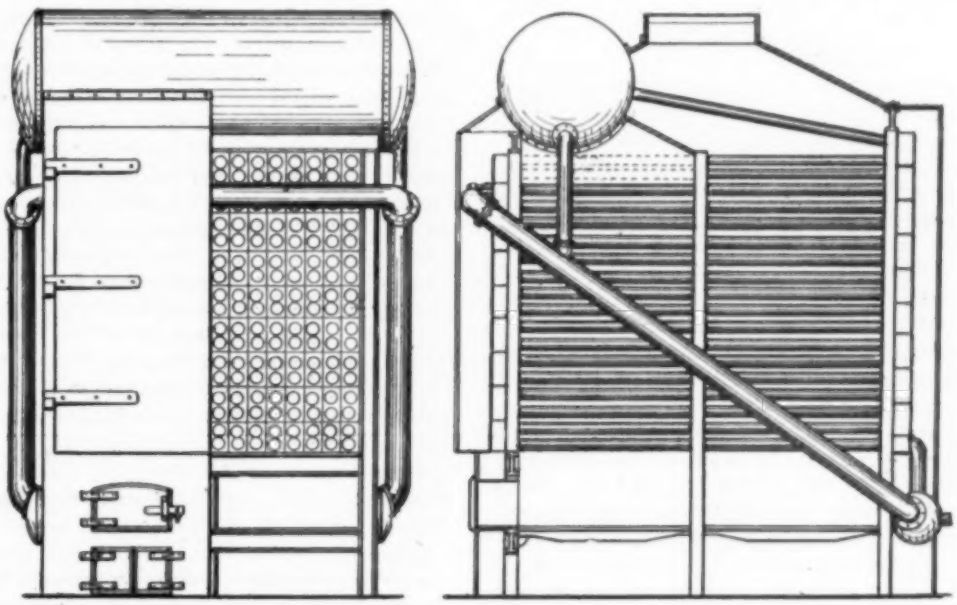
A battleship is not only a floating fortress, but is also a steam power plant of the largest size, with a greater variety and number of engines or machines than is ever dreamed of by the uninitiated. Of all this combination there is no portion that can be permitted to remain in a state of repose for any length of time without endangering its effective action when the emergency arises for which it was designed. It is only by constant use that they can be kept perfectly efficient, and at the same time this continued practice is equally necessary in order to familiarize the men with the details of the operation of every part and thus secure that prompt and certain response in time of action without which success is jeopardized to a degree difficult to overestimate. Of course, it is not difficult to understand that all this involves constant wear and tear, which can be compensated for only by as constant repair.

On an armored cruiser, like the Brooklyn, of the United States Navy, taking her as a sample of an up-to-date warship, between a battleship and an ordinary cruiser, there are altogether 81 separate engines, having a total of 156 steam cylinders.

Add, in imagination, to this number, imposing in itself, the vast quantity and extent of steam, exhaust and water piping needed to connect all these engines to the boilers, condensers and water systems; the thousands of valves to be kept workable and efficient! Then incliude the seven great boilers, capable of evaporating into steam, under forced draught, 185 tons of water an hour, and one can begin to comprehend the vastness of the steam plant of a modern ship.—[Cassier's Magazine, for September.

A NEW WATER TUBE BOILER.

A recent invention of interest in the field of steam power generation is one made by W. A. Lloyd, Ashtabula, O., of a new water tube boiler We show herewith two elevations of he boiler, in outline, showing the arrangement of the tubes. The material used in the boiler is marine steel, charcoal iron tubes, cast steel connections, and steel frame for support. Only straight tubes are used. They are expanded into place, and are so arranged that any one tube can be quickly removed without disturbing any other. They are arranged so that the water entering at the bottom flows directly through and upwards in each tube until it reaches the separating chamber, which is at the water level three or four rows from the top; there it separates from the steam and returns through the down-flow pipes at the sides to the reservoir or muddrum, which must give a constant and even supply to the tubes and create a positive, rapid and natural circulation. From the water level or separating chamber the steam passes through the upper tubes (which act as a super-heater), to the steam dome, by which time it is perfectly dry. Any moisture that may exist from carrying the valve too high in the boiler is drained by pipes from the bottom of the dome to the down-flow pipes. The mud drum is of sufficient size to give a full supply of water to the tubes, which is one of the principal necessities of this type of boiler. If the tubes are kept sufficiently supplied with water there is no danger of their being burned out.



A NEW WATER TUBE BOILER.

It will be observed from the illustration that in assembling the different parts accommodation has been made for the expansion. Each part can expand in any direction without interfering with any other part. At each end of each tube there is an opening in the header, for the purpose of removing the tube to be cleaned. The opening is covered by a small cap, which does not require any grinding or refacing to replace after removal, as the necessity for this is overcome by the use of a special joint, which also greatly facilitates cleaning and examining the tubes.

The front and rear of the boilers are fitted with doors which open the full space occupied by the ends of the tubes, making it easy to get at any one tube without getting in the furnace. The sides are also fitted with doors in such a manner as to open the whole internal part of the boiler to view. There are no tubes or pipes alongside the fires, thus doing away with the danger of burning out tubes so placed. There are no brick walls around the fire except in front to protect the fire doors and frames, thus doing way with considerable weight. The joints are all entirely metallic, none of them being fibre, rubber, cement, or the like. It was the object of the inventor to embody in the boiler strength, simplicity and durability, and at the same time make all parts easy of access; to make the boiler moderate in cost of manufacture and service, and efficient.

The boiler has been patented in this country by Mr. Lloyd, and he has applied for patents on it in foreign countries. He is prepared to negotiate for the building of the boilers for land or marine work, and will send further information regarding them to any applicant.

A YEAR OF IMPROVEMENT IN IRON AND STEEL.

In our last annual report, which appeared in June, 1897, the opinion was expressed that, instead of the unfavorable industrial conditions which then existed, "every branch of business in this country would be placed on the road to prosperity by an early and wise revision of the tariff which would fulfill to the letter the pledges made when Mr. McKinley was nominated." Exactly this revision of the tariff took place within a few weeks after the report appeared. On July 24 the Dingley tariff bill became a law. Business at once improved and it continued to improve throughout the remainder of 1897. Thus far in 1898 it remains in an improved condition, notwithstanding some unfavorable influences which will be referred to hereafter. In all manufacturing lines and in commercial circles generally there has been an increased demand for manufactured products and more general employment of labor. In the period that has elapsed since the Dingley tariff became a law, there has been greater industrial activity in this country than in any other period of 12 months since 1892.

This improvement in the industrial situation has been largely due to the complete restoration of business confidence which followed the enactment of the Dingley tariff, the fact being recognized on every hand that during the remainder of President McKinley's term, if not longer, the country's markets would be secured to our own people, while its finances would rest on a secure foundation. But it must be frankly added that the revival of industrial activity which followed the enactment of the new tariff was greatly promoted by the fortuitous circumstance that there was an extraordinary foreign demand in 1897 for our agricultural products, of which, happily, the year's harvests gave us a large surplus. Wheat rose to over a dollar a bushel before the close of the year. Railroad securities advanced in price in consequence of the increased traffic resulting from the increased demand for agricultural and other products. The increased foreign demand for our agricultural products has continued in 1898. In the early months of the year the price of wheat steadily advanced until it reached $1.85 a bushel. It is still above $1 a bushel, the foreign demand continuing with but little diminution in volume. Our crops for the present year will again be far beyond our own needs.

The railroad companies which have had their freight traffic increased by the improved demand for agricultural products, and by the general improvement in business, have freely given out orders for new cars and locomotives and for bridges and rails, and the prosperous farmers, especially in the great wheat-growing States, have not only in large part paid off their old debts, but they have also bought wagons, plows, and other farm implements in larger numbers than at any time for several years. Our iron and steel industries have therefore been especially benefited by the improved conditions of the last 12 months—benefited in every respect except in the prices received for their products.—[From General Manager Swank's Annual Report for 1897.

DANGER OF USING TOO HARD STEEL RAILS.*

BY C. P. SANDBERG, M. INST. C.E.

Having had many years' experience as consulting engineer and rail inspector for the Swedish State Railways, as well as for most of the private lines in Sweden, I propose to give a short outline of this experience with special reference to the danger of using too hard steel rails.

Duration of Iron Rails in Sweden.

The iron rails used up to 1872 were mostly made in Wales, but, owing to their unsoundness, were then superseded by steel rails. The superiority of steel rails was demonstrated after five evenings' discussion at the Institution of Civil Engineers in 1868, when I read my first paper on "The Manufacture and Wear of Rails."

However as a proof that good iron rails could also be made, the experience in Sweden may be mentioned, where the rails on the State lines have had an average life of 20 years, and a total tonnage passing over them of 10,000,000 tons; also that of the largest private railway in Sweden, the Bergslagarnes, 300 miles long, all the rails for which were made at the Dowlais Iron Works. They have had an average life of 20 years, and 10,000,000 tons of traffic have passed over them, and during the whole time only half a dozen rails have broken. The president, Mr. E. P. Martin, who was then works manager at the Dowlais works, should have the credit of these good results of his rails.

Steel Rail Fractures.

As regards the duration of steel rails, Sweden has not as yet had enough of experience, as none have worn out; but as regards safety from fracture there is no reason to complain. The number of fractures has varied from 10 to 100 per annum, according to the severity of the winter, with an average of 26 per annum; but in no case have the rails broken in more than one place, and they have been easily replaced without causing any accident. Compared with English railways, whose average rail fractures I believe to be about 300 per annum for the last few years, or one fracture per annum for every 70 miles of line, the Swedish State Railways have one rail fracture per annum for every 92 miles, there being 2,300 miles of line.

As for rail fractures on the private lines, which are 4,200 miles in length, few statistics are kept, as very few rails have been broken. Nowhere in Europe are there more broken rails than in Germany, probably owing to the too light weights of rails used.

The diagram on the Swedish State Railways shows the increase of mileage of road built year by year, and of tonnage carried per annum from the commencement, from 1856 to 1896, or 40 years.

The steel rails used have been made in different countries, England, Wales, Belgium, Germany, and some few in France, as well as some in Sweden, the latter from charcoal pig iron, but the bulk of them were made in England from hematite pig. It would occupy too much time to go into the detalis of the chemical composition used in the different countries by different makers. Suffice it to say that each manufacturer has been allowed due consideration as to the use of what he considered best; and it is satisfactory to be able to state from experience on the road, that good results have been obtained with very different chemical compositions.

A medium hardness has always been aimed at, as well as a minimum of phosphorus for the cold climate of Sweden, and the hardness has been obtained by means of carbon and manganese, and even silicon, all giving satisfaction both as regards safety and wear. Lately, however, the higher wheel loads and speed have made it desirable to use a harder quality of steel to avoid crushing of the rail ends; and since the regularity in blowing of steel by the Bessemer process has been made more certain, the hardness has also gradually been increased by using more carbon, or from 0.35 to 0.45 per cent, and more manganese up to one per cent, the silicon being up to 0 1 per cent, and the phosphorus not more than 0 075 per cent.

Danger of Using Too Hard Steel Rails.

There have been some sensational articles published of late years, principally in America, arguing in favor of rails with both 0.50 per cent and 0.60 per cent carbon and even more, and this I would strongly contest, particularly in countries with a cold climate like Sweden, on the following grounds: 1. That so hard a rail, subject as it is to so many variations in the manufacture, will unavoidably bring in an element of danger to rail fractures in such a way as to make the rail fly in many pieces, and thus without doubt cause accidents; 2. That the flattening of rail ends can be partially overcome by giving greater bearing surfaces between rails and fish-plates, as in my new rail sections and rail joints, as well as by avoiding too heavy wheel loads and also by adopting heavier rails; 3. As for wear, it is doubtful whether hard rails stand most wear; at least Mr. C. B. Dudley, chemist to the Pennsylvania Railroad, argues in favor of soft rails, and Mr. P. H. Dudley, of the New York Central, advocates hard ones, even containing 0.60 to 0.70 per cent carbon and more.

In any case, no railway engineer has a right to run any risk to the safety of his line by using too hard rails that may fly in many pieces, causing accidents, for this would be the most expensive for the railway, leaving out the question of humanity, even should the flattening of the rail ends not be altogether preventable with a medium hard rail steel.

Experiments having been made with a few casts on this excessive hardness of carbon, i. e., 0.60 per cent in 80-lb. rails, it was found that they flew in many pieces with less than half of the specified tup test for safety, while those with 0.45 per cent carbon stood one ton falling 20 feet. To make 0.60 per cent carbon rails to stand the tup test, every other element must be brought down to a minimum, and after all it would be no gain to either producer or consumer, as hardness is much better obtained by carbon together with manganese, and even silicon. Besides, it must be remembered that manufacturers are not druggists, who can alter the composition of their rail steel to comply with the respective prescriptons of every engineer. As for the demands of the latter in specifying chemical composition and a high percentage of carbon, I think the question has been thrashed out and the engineers have returned from the battlefield with more moderate demands in their own interests both as to hardness and details of chemical composition, and have been satisfied with specifving mechanical tests only.

Testing of Steel Rails.

The Railway Congress in Paris in 1889 demanded rather hard rail steel, but the Congress in London in 1895 would not sanction it. I trust that at the coming Congress in Paris in 1900 engineers will leave out the chemical composition in their specifications altogether, and only demand an adequate tup test for safety, as well as a limited deflection to secure the required hardness, leaving out the tensile tests altogether. These latter are entirely out of place for rails, which are subjected in use to a blow or impact, besides tensile tests are both slow and costly for the preparation of test pieces.

The rail is subject to a blow in practice, and therefore should be tested with a blow. The tup test could be done with one rail end for each cast, and the maximum deflection to specify for each rail section could be obtained by experience in testing rails of the required hardness in each rail section, to serve for a hardness as well as for a safety test. This system of combined testing would cost next to nothing, and would not delay the inspection of the rails.

With the present low rate of steel rails at £4, 10s. per ton no unnecessary cost or hindrance should be involved in the testing and inspection; and if the manufacturer guarantees his rails for five or seven years, he should, at least, not be forced to make too hard rails that will break, or have any chemical composition specified that is unnecessary and involving an additional cost. On the other hand, if the railway engineer gets rails safe and hard enough to last very much longer than the iron rails, and can sell his old worn-out rails for more than half the value of new ones (at present the price is £2, 10s.), his best policy should be to use heavier rails, of a safe degree of hardness, and thus economize in both sleepers and cost of maintenance, and not be led astray by sensational articles in trying to run up to extreme hardness, to make up for the deficiency in the present too light weight of rail section, thereby risking accidents.

I have at least followed a safe practice for both the Swedish

* Read at the Autumn meeting of the Iron and Steel Institute, held at Stockholm, Aug. 26 and 27.

State and private lines, and also for other parts of the world, with such results that I have not yet had any rails flying in many pieces or causing derailments, and the economical wearing results have also been very satisfactory.

Although I am quite open to conviction and ready to move with the times, I have thought this opportunity of the Iron and Steel Institute's meeting in my native land too precious to let it pass without having the benefit of a discussion and the results of your valuable experience on this question, which is most important for Sweden as well as for other countries.

As I take it that the object of the Institute's visits to foreign countries should be to exchange information, Sweden, I think, is able to offer in exchange for the above information, demanded on the danger of using too hard steel rails, some very interesting facts on light railways—all the more valuable since such have now been allowed to be introduced in England, where more than 1,000 miles are now authorized to be built, and the first has just been started.

Light Railways in Sweden.

With the building of these light railways in Sweden, I have been connected, as far as the rails are concerned, since the commencement, and I have, during these 30 years, constantly published in the English press—principally in *Engineering*—what has been going on in Sweden, and it is only its great distance from England that can explain why so little good has resulted from these representations; but now that you are here, although not specially railway engineers, I would strongly recommend you to study the light railways of Sweden, not only from the map accompanying this paper, but also in reality. There is nothing that Sweden has to be so proud of as the development in the last 40 years of its railway system. The State laid out the main lines, but the feeders, which have twice the mileage (and what would the State have been without them?), were laid out by private enterprise, and the results of both have been a commercial success. Instead of railways being a burden to the country, they now stand as a source of income, and an extension is now going on of more than 1,000 miles, partly of State and partly of private lines.

By examining these private railways in Sweden you will find them divided into two classes—normal gauge of medium heavy construction and some few narrow gauge of very light construction (see blue and black lines on the map). They have both answered their purpose—namely, for cheap local transport and as feeders to the main line, but nowhere has the narrow gauge broken the main-line system as in Norway.

The reason of their cheapness in construction is the absence of financial and parliamentary expenses, with cheap land, material, and labor, and absolute honesty in management. Comparing the new English law for light railways and the Board of Trade stipulations of a minimum weight of rail of 56 lbs. per yard, a maximum axle load of 10 tons, and a maximum speed of 25 miles per hour, with the Swedish practice on the railways, the conclusion would be that Sweden has a much heavier rolling stock upon lighter rails running with higher maximum speed. For a 56-lb. rail weight we have an axle load of 12 tons and a maximum speed of 40 miles per hour. When we calculate that the English main lines laid with 85-lb. rails and 45-lb. chairs would correspond in cost to a railway using flange rails of 120 lbs. per yard (and we have only of late increased the State lines and some of the private lines to 80 lbs. per yard from 66 lbs.), we may come to the conclusion that if England is on the safe side, we are still running some risk, but so far we have had no accidents from broken rails. It really seems, with the weights of rails as with the hardness of rail steel, that the happy medium is to be sought for. There is, however, no doubt that Sweden has built its railways with too light rails, and I have, therefore, just read a paper before the Railway Association at Stockholm on the advantage of using heavier rails, both for safety and economy, and it wil soon be published in England. It is satisfactory that the State railways are contemplating using 90-lb. rails in order to get cheap transport for the new mineral line to be built from Gellivare to Ofoten, and it is to be hoped that the private railways will follow the example of increasing their rail weights generally in proportion to their requirements, in order to save maintenance and obtain cheaper transport.

Conclusion.

From the facts brought forward in this paper it follows that we in Sweden with our severe climate, should certainly not try to remedy the deficiency in weight of rails used at the original construction of our railways by now resorting to a dangerous hardness of rail steel retaining the same section, but rather adopt a heavier weight of rail of moderate hardness, and consider safety before all.

MINING ORE BODIES OF UNIFORM GRADE.*

BY E. F. BROWN, IRON MOUNTAIN, MICH.

The system of mining herein described has been in successful operation at the Pewabic mine, Iron Mountain, Mich., for a period of three years, and about 600,000 tons of iron ore has been extracted from the points in the mine where it has been found advantageous to make use of this method exclusively. This system has been employed most extensively upon a large body of highly silicious, hard hematite ore, of uniform quality.

For convenience in operating, the ore body is first divided into blocks, having a length, on the trend of the strata, of about 250 feet, the width of the blocks depending upon the distance between the slate walls, or foot and hanging, and the height being the distance between levels, ordinarily 100 feet. The main level is driven in the hanging wall slate, about 20 feet from the ore body, and parallel with its trend. From the main level, cross cuts are extended across the ore body to the foot wall. We usually make four cross cuts, thus dividing a block of ground 250 feet long into three blocks of about 80 feet each. Adjacent to the two cross cuts, which mark the eastern and western boundaries of the original block, we start upraises 50 feet distant from each other, and extend these upraises 80 feet, or within 20 feet of the level immediately above.

Chutes are constructed at the bottom of the upraises, and commencing at the top underhand stoping is carried on until a trench 8 feet wide and 80 feet deep has been cut across the ore body from foot to hanging wall. In the underhand stoping the ore falls into the chutes when blasted, and is run into the tram cars without being handled. During the time required to cut the trenches across the ends of the block, we are also employed in undercutting it, and when the trenches are completed we have two strong pillars alongside of the main cross cuts on the ends of the block, while the balance of the ground is resting on small legs of ore, irregular in size and shape. These legs and pillars are then made as small as is consistent with safety to our miners. The remaining portion is then drilled, and when all have been drilled, they are blasted in sections. The ends of the block being cut off and the entire block thoroughly undercut, the ore soon begins to cave; this usually occurs in large masses of many hundreds of tons each.

To illustrate the hardness of the ground and the results obtained, it may be well to state that no timber is used in prosecuting the work just outlined, and that it requires several weeks for a block of this ore to settle a distance of seven feet, but within six or eight months the ore becomes crushed so that four-fifths of the entire block could be put through a three-inch opening. After the block of ore has settled down to the original level, and been sufficiently crushed to allow easy driving of cross cuts, the two cross cuts in the central portion of the block are advanced through the caved ore and from these cross cuts drifts are run to the eastern and western boundaries of the caved territory. These drifts are usually located about 25 feet apart on the line of the cross cuts. The drift nearest the foot-wall is connected with the adjacent cross cut, and from this drift short cross cuts are extended, at intervals, to the foot wall. These drifts and cross cuts are all closely timbered, and after the initial timbering require but little attention in the way of repairs.

The work of mining is now commenced by allowing the caved ore to run into the drifts and cross cuts through the opening in the end, or breast, of each. The broken ore is simply shoveled into the tram cars and taken to the shafts, the breast of the drifts always being full of broken ore. When a full output is desired, the crew consists of one miner

* Read at the fifth annual meeting of the Lake Superior Mining Institute, held Aug. 16, 17 and 18, 1898.

and four shovelers at each of the points in operation. Two of the shovelers are always employed in filling the ore, while the other two are tramming it to the main level. No drilling is required and but little powder is used in blasting. Drawing the ore in this manner forms funnel shaped spaces in the body of broken ore, and these are eventually filled by the caving of the timber and broken sandstone from the old level above. When the ore has been so far removed at any point, that the waste material is shown in the working faces, we blast a few of the timbers in the drift and draw our point of operations nearer to one of the main cross cuts. This operation is continued and repeated until the ore, in the territory formerly traversed by the drifts, has been exhausted and replaced by the waste from above. Other drifts from the main cross cuts are then driven in the pillars remaining between the first drifts, and the operation repeated as in the first work. In actual work it is found possible to draw the ore for three or four feet on either side of these drifts, consequently the second set of drifts practically clean up the broken ore.

The typical block of ore, herein described, was caved during the fall of 1897. This block contained, originally, about 350,000 tons of ore and it has yielded about 120,000 tons during the present shipping season. A much larger output could have been attained if desired. We have never had any fatal accidents in connection with the operations under this system, and it can, without exaggeration, be called a safe method of mining. With modifications to accommodate varying conditions, this system has been applied to the mining of soft ore bodies, and the results obtained in this direction have been satisfactory to us.

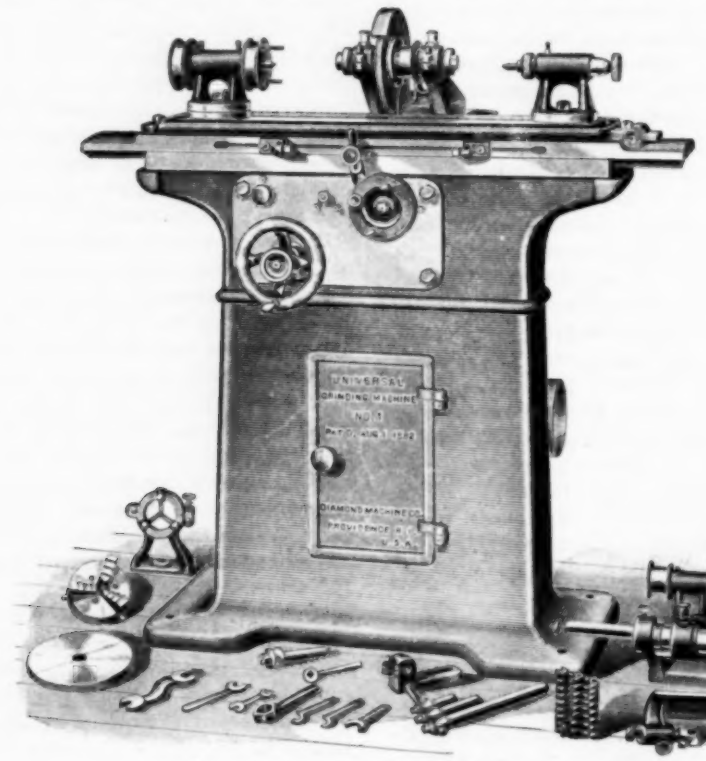
In speaking of the use of large wheels under engine trucks and tenders an engineering paper gives the difficulty in making a chilled cast iron wheel of more than 33 inches diameter as one reason for the occurrence of small wheels. The *Railroad Gazette* comments: "We learn that the New York Car Wheel Works has been furnishing chilled cast iron wheels of larger diameters for three years; of 40-inch wheels they have sent out on orders 356, of 42-inch wheels, 76, and two lots of 45-inch wheels were furnished to the Baldwin Locomotive Works last spring. One lot of the 42-inch wheels made upwards of 100,000 miles and no one of these larger diameter wheels has been returned for any any cause."

The strike at the plant of Russell & Co., Massillon, O., has been settled satisfactorily, and the works are again in operation.

A UNIVERSAL GRINDER.

The No. 1 universal grinder shown herewith is the latest pattern of machine manufactured by the Diamond Machine Co., of Providence, R. I. This company has been making universal grinders for 10 or 15 years, but its first machines were crude in comparison to this, the highest and best evidence of its mechanical skill. The increasing nicety with which machine shop work must be done has demanded within the last few years a machine which would embody all the finest possible adjustments and facilities for doing a large variety of work. A machine that meets the requirements of the average machine shop is the universal grinder, as on this machine any cylindrical or concave surface may be ground and by means of attachments, cutters, reamers, etc., may be sharpened, internal grinding of all sorts can be done, and surface grinding to within the limit of the machine, which are usually small for this class of work.

The machine here shown has wheel spindle, head stock and foot stock of steel, carefully ground and run in bronze boxes adjustable for wear and protected from emery dust. The wheel stand slide swivels and has a graduated base. The end of the spindle is drilled to take taper mandrel for carrying small wheels for facing work. The head is removed



NO. 1 UNIVERSAL GRINDER.

when the internal grinding fixture is used. The wheel stand is moved by hand graduated to thousandths of an inch on diameter of the work. It has an adjustable stop, so that the wheel may be run back and brought up to the same place as before. When internal grinding is done the wheel stand is removed and the internal grinding fixture shown is substituted.

The sliding table carries a swivel table turning upon a center pin. The swivel table is provided with tangent screws in order to set it accurately and has graduated scales. The sliding table may be fed in either direction by hand or automatically, the amount of travel being controlled by dogs which engage a lever on the front of the machine. The slides are carefully scraped to straight surfaces and are protected from emery dust. The head stock is clamped to the swivel table. It swivels and has a graduated base and may be set at right angles for grinding work on face plate or chuck, or at any degree for grinding centers. The front end is threaded and fitted with a No. 1 Morse taper hole. If work is to be ground on dead centers, the spindle may be locked and the work revolved by means of pulley on front end of the spindle. There is a special device for taking up the wear.

The foot stock is clamped to the swivel table. The spindle is adjusted by a screw and a spring is provided to adjust the spindle if the work expands. All these universal grinders are provided with pump and water tank. Ample provision is made for taking care of the water.

Universal grinders of the Diamond Machine Co. are made in five sizes, as follows: No. 1 takes work 18 inches long, 8 inches diameter; No. 2, 24 inches long, 10 inches diameter; No. 3, 30 inches long, 12 inches diameter; No. 3B, 40 inches long, 12 inches diameter; No. 3C, 60 inches long, 12 inches diameter.

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Ever notice the color, or apparent color effect, of a jet of steam issuing from a pet cock in a live steam main? Was it whitish? That was due to entrained moisture. The bluish color, or perfect transparency, is present only when the steam is dry.

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HARRISON SAFETY BOILER WORKS,
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INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Pittsburg Sheet Mfg. Co., of Pittsburg, has applied for a charter of incorporation. The incorporators are: R. A. Wilson, William Shoof, J. S. Knight, L. L. Woodward, Edwin Marshall and E. E. Hicks.

The Eagle Mfg. Co. has been incorporated at New York, with a capital stock of $10,000, to manufacture art metal goods. A. A. Greenhoot, 26 E. 118th st., New York, is interested.

The Transue & Williams Co., Alliance, O., has been incorporated, to manufacture forgings, with a capital stock of $50,000, by Silas J. Williams, Oliver F. Transue and others.

The Hardie-Tynes Foundry & Machine Co., Birmingham, Ala., will buy a 48-inch to 52-inch lathe, 20-inch centers; one steam hammer; one pipe-cutting machine, to take one inch to four inch pipe, inclusive; second-hand.

W. K. Henderson Iron Works, Shreveport, La., is reported in the market for a bolt machine to cut bolts up to 1½ inches and 2 inches.

National Shovel Works, 700-710 Western Union Bldg., Chicago, are in the market for a number of large blanking presses, also five or six bored friction or steam drops, with from 800 to 1,200 pounds head, distance between uprights 20 inches or over; second-hand machinery in good condition.

New Construction:—

The Lunkenheimer Co., Cincinnati, O., which has for a long time suffered from lack of room in its present plant, has made arrangements for the erection of a modern factory, occupying an entire block, in Fairmount, O. The new structure will be five stories, with a frontage of 300 feet on Tremont st., 186 feet on Beekman st., 180 feet on Lawnway st., and 250 feet on averly ave. The structure will be of pressed brick and freestone trimmings, and the entire building of mill construction, with steel girders and wrought iron columns, all resting on concrete foundations. A novel feature in the make-up of the factory will be introduced, in that the foundry will be located on the top floor with concrete floor and steel trusses to protect it. It has been arranged to put in necessary switches for the new plant to enable the concern to reach the C., H. & D. Railroad. President E. H. Lunken, who has been in Denver for some time for his health came on to complete arrangements. The new plant will enable the company to increase its force, as has been intended for some time, to at least 1,000 hands.

The plans for the new plant of the Janney Mfg. Co., Ottumwa, Iowa, have been completed, and construction will commence at once. The plant will consists of a machine shop 50x100 feet; blacksmith shop, 50x100 feet; power house, 50x60 feet; foundry, 75x150 feet; main building, 50x150 feet, two stories; woodworking shop, 50x60 feet, and pattern shop, 40x40 feet.

The estate of C. M. Robertson, Montville, Conn., will put up a thoroughly fire-proof construction in place of the one recently destroyed by fire. The building will have steel framework, brick side walls, and an absolutely fireproof roof, consisting of corrugated iron covering laid on the Berlin Iron Bridge Co.'s patent anti-condensation roof lining. Steel trusses will support the roof. The building is about 50 feet square, divided by a corrugated iron partition through the center, making a boiler room and pump room. The ventilation is obtained by monitors on the ridge of the roof, having sash on the sides. The Berlin Iron Bridge Co. is furnishing and erecting the steel work.

A plant for the manufacture of Portland cement from furnace slag is being erected by the Clinton Iron & Steel Co., of Pittsburg, adjoining its blast furnace. The buildings and machinery will cost $150,000.

Work has begun on the new Dunlap Vehicle Co.'s plant at Pontiac, Mich.

The Schiffler Bridge Co. has secured the contract for the erection of a new plate glass plant at Toledo, O., for the Ford

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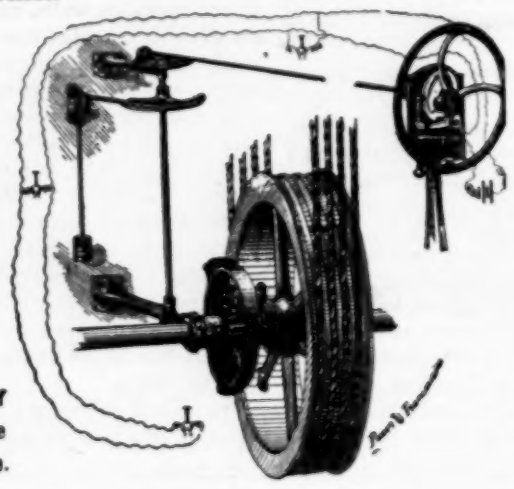

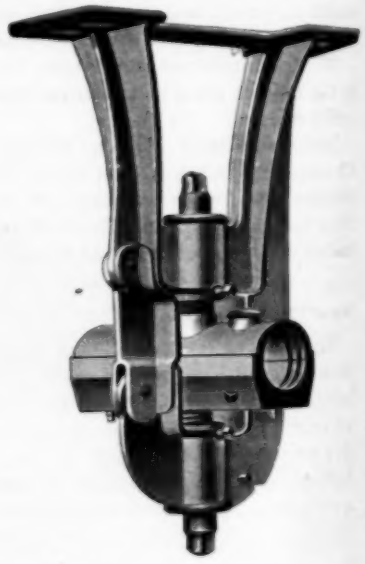

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GENERAL AGENTS FOR THE DODGE INDEPENDENCE WOOD SPLIT PULLEYS.

interests. The contract calls for the expenditure of $300,000 for labor and material. The company will also build a new ordnance machine shop for the Midvale Steel Co., at Philadelphia.

Additions, Enlargements, Removals, Etc.:—

The Illinois Screw Co., manufacturers of machine screws, 40 S. Canal st., Chicago, is building an addition to its factory at Chicago Heights, which is to be 54x185 feet, two stories. The company has found its business increasing too rapidly for the present facilities.

The addition to the plant of the Springfield Machine Tool Co., Springfield, O., 60x175 feet, in size, is nearly completed.

The Racine Malleable & Wrought Iron Co., Racine, Wis., whose plant was destroyed by fire lately, will rebuild at Racine Junction.

William Norton, Puget Sound Boiler Works, Tacoma, Wash., is building an addition 30x40 feet to his plant.

The King, Gilbert & Warner Co., Columbus, O., has bought 15 acres of land.

J. C. Brannon, operating a machine shop and foundry at Athens, O., contemplates removing to Charleston, W. Va.

Fires and Accidents:—

The manufacturing department of the factory of the Vitrified Wheel Co., Westfield, Mass., was damaged by fire on

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SHENANGO VALLEY STEEL CO., New Castle, Pa.,

MANUFACTURERS OF

Bessemer Pig Iron, Steel Billets, Blooms, Black Plate, Tin Plate, Tin Plate Bars, Wire Rods, Market Wire and Wire Nails.

Tuesday, Aug. 16, to the amount of about $3,000, covered by insurance. There will be no delay in filling orders promptly, as the fire did not reach the main stock room.

The plant of the Cleburne Foundry & Machine Co., Cleburne, Tex., was destroyed by fire Aug. 18, causing a loss of $3,500, with insurance of $2,000.

An explosion at the foundry of William Tod & Co., Youngstown, O., Aug. 20, caused considerable damage.

General Industrial Notes:—

The bar mills, at Frankton, Ind., of the Northwestern Iron & Metal Co., of Chicago, have shut down for repairs, after running for nearly two years steadily. Another heating furnace will be built for their 8-inch train, and another busheling furnace will be added. The improvements and alterations to be made will increase the capacity 25 per cent. The mills will be started again at once.

The forgings for the engine for the Boston Elevated Railway Co. will be made by the Bethlehem Iron Co., South Bethlehem, Pa. The shaft for this engine is to be 27 feet 10 inches long and 37 inches in diameter. It will be hollow forged, having a hole 17½ inches in diameter. The shaft when completed, together with cranks and fly wheel hub, will weigh upwards of 150,000 pounds. This will be assembled at the works of the Bethlehem Iron Co., and transported in its entirety by rail to Boston.

The Coleraine furnaces, at Redington, Pa., have been sold and dismantled.

It is reported that the Alabama Rolling Mill Co., Gate City, Ala., is to build a steel mill at a cost of $150,000.

Joanna Furnace, Reading, Pa., will be put in blast in a short time, it is reported.

The plant and holdings of the Valentine Iron Co., Bellefonte, Pa., were sold at sheriff's sale Aug. 22, for $1,000. The sale was subject to a lien of $165,000. Attorneys for the plaintiffs in the case were the purchasers. Plans are being made for a reorganization.

The Missouri Wire & Nail Co., St. Louis, has completed its works at East St. Louis, Ill., and has begun the manufacture of wire. It is understood that the product will be plain wire, principally, only a limited number of nail machines having been installed.

The new furnace of the Reading (Pa.) Iron Co., which is being built will be ready to go into blast about January, 1899.

The stack will be 80 feet high, 17 feet bosh, and will be equipped with four Massick & Crooke hot blast stoves, 19½ feet in diameter, and 75 feet high.

The deed conveying the property of the Bass Foundry & Machine Works to the Bass Foundry & Machine Co., Fort Wayne, Ind., has been filed, the consideration stated being $1,200,000.

Ellwood Ivins, president of the Ellwood Ivins Tube Co., Philadelphia, recently secured another patent on a machine for making seamless tubes. By this process a tube is cold drawn, it is said, from 10 gauge to 16 gauge in one pass, and from 18 to 24 gauge, etc. When it is considered that by the old process a tube is only reduced one gauge between each

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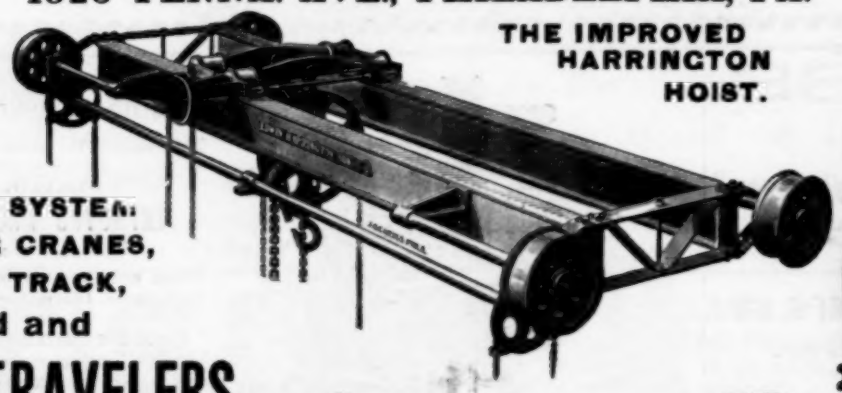

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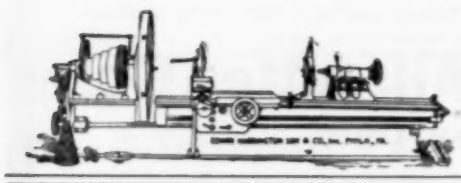

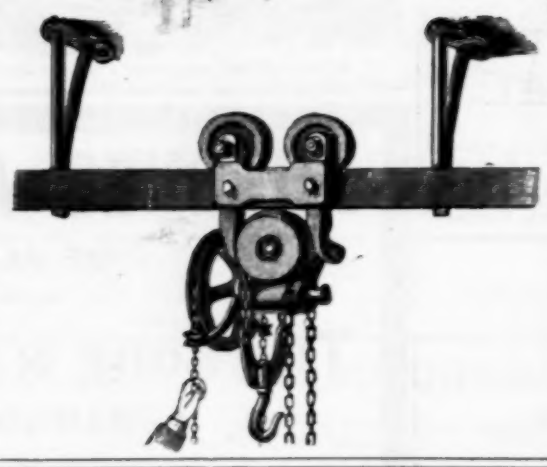

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successive annealing, the importance of this achievement is apparent. Mr. Ivins was a pioneer in steel tube making, and is said to have been the first in America to make seamless steel tubes, having made them continuously since 1876. He has about 20 patents on tube making alone. The Ellwood-Ivins Tube Co. has no connection with any other mills.

The Shiffler Bridge Co. will put a force of men at work immediately on trestles and railway tracks about the plant of the Riverside Iron Co., at Benwood. The bridge company will also put in coke bins in connection with the new coke plant there. The contract is a large one, and it will take a force of at least 50 men four months to complete it.

The Youngstown Car Works have a contract to equip 250 gondola cars with Westinghouse air brakes for Oliver Bros. & Co.

Pioneer furnaces at Thomas, Ala., went into blast Aug. 19, after a long idleness.

Within the last 60 days the receivers of the Baltimore & Ohio have ordered almost 6,000 new freight cars, of which the Pullman company is building 1,000 box cars and 1,000 drop and gondolas; the Michigan-Peninsular 3,000 box cars, and the South Baltimore Car Works, 200 box cars, 500 hopper coal cars, and 15 four-wheel cabooses, making a total of 22,735 freight cars ordered in less than two years.

The Kelly Nail & Iron Co., Ironton, O., has made a contract for wire drawing machinery and a wire nail machine plant, the work to be completed by Nov. 1. The nail machines will be furnished by the National Machinery Co., of Tiffin, O., and the wire drawing machinery by the Turner, Vaughn & Taylor Co., of Cuyahoga Falls, O.

The Means-Fulton Iron Co., Birmingham, Ala., has the contract to furnish the stacks for the steel plant of the Alabama Steel & Ship Building Co. The ten stacks will be constructed of rolled steel plate, with cast iron finishing, each seven and one-half feet in diameter and 150 feet in height. There will be required 250 tons of plates, 14 tons of rivets, 5 tons of anchor bolts, and 45 tons of castings.

The U. Baird Machinery Co., of Pittsburg, was among the successful bidders at the Navy Department last week for furnishing the machinery and tools for the League Island Navy Yard, Philadelphia.

At the annual meeting of the stockholders of the Pittsburg Forge & Iron Co., the officers and directors were re-elected. Calvin Wells is president and F. E. Richardson secretary.

Miller Bros. & Co., Tradesmen's Bldg., Pittsburg, have completed a bending furnace for the Pittsburg Valve & Machine Co., Ltd., of Allegheny, and have installed Duff gas producers for the Buhl Steel Co., Sharon, Pa.; Union Rolling Mill Co., Cleveland, and the Otis Steel Co., Cleveland. They have also an order for a heating furnace for the Canton (O.) Steel Co., and have had a large force of men at Muncie, Ind., rebuilding soaking pits and open-hearth furnace.

The old Corning sheet mill at Hammond, Ind., has just been started up by the Hammond Sheet Steel Co.

The blast furnace of the Youngstown (O.) Steel Co., which has been closed down for the past two months, undergoing repairs, resumed last week.

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September 5th to 11th, inclusive, account of Elks' Street Carnival. Tickets good returning to September 12th, inclusive. This will be a show of great credit to Canton and every one should see it.

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Thursday, September 8th, account of Elks' Day at Canton Street Carnival. Tickets good going and returning date of sale only.